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Porters and the Public

THE publicity given to an exchange of correspondence between a disgruntled passenger and the department of the Chief Commercial Manager, Southern Region, British Railways, regarding the duties of porters has rightly caused public concern. To the question "Who is responsible for carrying a passenger's luggage?" the correspondent was told that it was not one of the duties devolving on porters to carry luggage to or from platforms when it is taken in a compartment with a passenger. This interpretation of the rules, however correct from a legal viewpoint, is nevertheless a direct infringement of custom and usage. Public satisfaction should be put before legal interpretation which has probably faded from prominence with the passage of time. In an attempt to clear up misunderstandings, Sir Brian Robertson, Chairman of the British Transport Commission, has stated: "The position is that it is a duty of porters, unless engaged on other work, to help passengers in every possible way, including carrying their hand-luggage between platforms." His statement is welcome indeed. It is a practical contribution to public goodwill and very encouraging at a time when British Railways is facing so much competition, especially by air transport undertakings, which provide free porterage. The nearest thing to a regulation concerning the matter of carrying luggage which is taken in a compartment with the passenger is the following sentence from the rule book which governs the conduct of British Railways employees: "They must be prompt, civil and obliging and afford every proper facility for the railway's business." A strict observance of this rule by all platform staff in carrying out their jobs would foster a very congenial atmosphere and go a long way to win back lost traffic. The Central Transport Consultative Committee for Great Britain, meeting in London last Tuesday, gave full support to Sir Brian Robertson's statement and has asked the Commission to ensure that the position is made clear to every stationmaster. Sir Brian Robertson rightly points out that apart from inevitable exceptions, British Railways porters are giving willing, courteous service to passengers up and down the country. His statement will, no doubt, act as a timely reminder that the railway porter has an important duty to the travelling public.

Shortening the Benguela Route to Rhodesia

A JOINT committee appointed by the Governments of the Federation of Rhodesia & Nyasaland and of Northern Rhodesia has recommended to Rhodesia Railways high priority for building a line connecting Northern Rhodesia with the Belgian Congo. The committee was set up to consider ways of helping the mining town of Bancroft, stricken when the copper mine closed recently as the result of the fall in the price of that metal. The proposed link would only be seven miles long, but would cut off the long haul of Rhodesia bound goods 100 miles down the Congo salient from Tshinsenda to Ndola. It has been stated that its construction would speed up deliveries of railborne traffic from Lobito Bay, in Angola, over the Benguela Railway to Chingola and Bancroft by up to a week. The Benguela Railway already affords a route from Europe to Northern Rhodesia with considerably shorter sea transit than via Indian Ocean ports; consignments via Lobito are delivered 30-35 days after despatch. A good deal has been done by the railway administrations in the Portuguese, Belgian, and British Commonwealth territories concerned to encourage traffic by quoting favourable rates to and from Rhodesia via Lobito.

Prompt Action to Repair Storm Damage

THE fact that all affected routes of the Southern Region of British Railways, with the exception of the Westerham branch, were open to traffic only 48 hr. after being cut, blocked, or flooded in 39 places many miles apart, says much for the promptitude, skill, and devotion to duty of all concerned in the departments of the Chief Civil Engineer and Signal Engineer of the Region. The storm which swept across South-East England on the evening of September 5, and was described by meteorological observers as "probably one of the most spectacular of the century," badly affected signalling and cables and left miles of track to be repaired. The extent of the damage is described elsewhere in this issue. Emergency repairs were carried out and in some cases trains were running by the following morning. Credit is also due to the station staffs who did so much to provide for the comfort of stranded passengers, and also to make emergency arrangements for bus transport where possible. A tribute to all these untiring efforts was paid by Sir Arthur Warter, Chairman of the Southern Area Board, who, in a message to the Southern Region staff, thanked all those who helped to restore and run services after what he described as "the worst peacetime weekend in the Southern's history."

Closing Unremunerative Lines and Stations

TO judge from the announcements made by the Regions of British Railways, there is a quickening of the pace at which withdrawals of unremunerative services are taking place. The Area Boards of the British Transport

Commission are making good use of the freedom of action accorded by the Transport Act of 1953, which supersedes the requirement of the 1947 Act, to provide an "efficient, adequate, economical, and properly integrated system of inland transport." Under the 1953 Act, the Commission must provide, except in the London Passenger Transport Area, services to such places and to such extent as may appear expedient. The discretion is subject to any direction to the contrary by the Minister of Transport & Civil Aviation. The Minister has never yet had to exercise his power of direction, because the Commission has invariably accepted the recommendation as to proposed withdrawal of a service, of the Transport Users' Consultative Committee, which, however, has by no means always been in agreement with the Commission's proposal. The present Minister, Mr. Harold Watkinson, moreover has shown himself wholeheartedly in favour of withdrawing a service when it is clear that it cannot pay its way.

The New Stockport Road Bridge

IN preparation for the Crewe-Manchester electrification (under the British Railways modernisation plans), reconstruction of a skew bridge over Stockport Road, Manchester, is being undertaken. The existing bridge consists of two structures each carrying two roads of the quadruple tracks. One built in 1840 consists of a cast-iron arched central span over the road with a masonry arch on each side of it over the pathways. The other bridge, constructed in 1880, has a wrought-iron girder superstructure spanning between the abutments, but supported additionally by cast-iron columns at the roadway curbs in line with the piers of the older bridge. Both bridges were nearing the ends of their economic lives and needed excessive maintenance. Moreover, it was considered necessary to ballast the tracks over them in connection with the electrification. The new structure replacing them is of unusual interest in that it consists of four independent concrete box-girders of 122-ft. span, one under each track, and composed of 16 pre-cast units and the whole pre-stressed. Owing to the acute skew of these box-girder beams, the bearings under their box-section webs are staggered, giving rise to interesting problems of load-distribution and bearing-adjustment. The outer bearings are of unusual design and with the new structure and its erection are described elsewhere in this issue.

Canadian Railway Wages Dispute

THE Canadian National and Canadian Pacific Railways now have submitted their application to the Board of Transport Commissioners in Ottawa for authority for an immediate increase in freight rates of 19 per cent; on coal and coke the increase requested is of 25 cents a ton. The sole purpose, it is stated, is to provide additional revenue sufficient to meet the cost of higher wages and certain increased benefits for all railway employees on the basis recommended by the Conciliation Board for "non-operating" staff. The railways have not the financial means of meeting these additional wage costs. They cannot increase their charges until the Board of Transport Commissioners has authorised them to do so. As the situation is urgent, and a strike vote is being taken by the non-operating unions, the railway managements have asked the Transport Commissioners for a hearing as early as possible in October and hope that the Board will be in a position to give a decision shortly thereafter.

Inaccurate Criticism of London Transport

RARELY does a senior officer of a transport undertaking make such inaccurate observations as those on the London Transport Executive made by Mr. Norman Morton, General Manager & Engineer of the Sunderland Corporation Transport Department, in a paper to the Municipal Passenger Transport Association conference in Blackpool last week. He states, for instance, that L.T.E. is too big, and that the Chambers Committee report (of 1953) did not appreciate that this was a source of weakness. The possibility of reducing the size of the London Transport Area was rejected by the Committee as conducive neither to economies nor to efficiency; it would certainly complicate operation of the Underground. The suggestion is made that L.T.E. should be divided into four separate bodies operating "on a fully co-ordinated basis." Besides being self-contradictory, this ignores operation and financing of the Underground. In stating that more public control of London Transport is needed, Mr. Morton has ignored the Chambers Committee rejection of this suggestion. In maintaining that London Transport fares are too high, he does not seem to realise that the level of fares covers provision and working of the Underground, which, while not profitable by itself, is essential to London, and without which road services would be quite inadequate. Even as a busman he should have realised the significance of the L.T.E. railways. But he is inaccurate also in references to purely bus matters.

South Yorkshire by Pullman

THE initial runs earlier this week of the "Master Cutler" and of the other pair of all-Pullman expressés of the Eastern Region between Kings Cross and Sheffield Victoria via Retford, have confirmed that the loads of six vehicles are well within the capacity of the English Electric Type "4" 2,000-h.p. diesel locomotives on the four schedules: 2 hr. 45 min. each way with a Retford stop for the "Master Cutler" and 2 hr. 55 min. with three stops for the other trains, over 161 miles. No doubt the 2 hr. 45 min. timings will be cut in due course. The renovated stock in our experience rides well, and the appointments and service are of the usual high Pullman standards. With the additional facility of arranging with the Pullman car conductor en route to be met at destination by a self-drive or chaffeur-driven hire car under the Autobritn Plan, the "Master Cutler," which leaves Sheffield at 7.20 a.m. and returns from Kings Cross at 7.20 p.m., is particularly convenient for travellers on business from Sheffield, who have a full day in London with no unduly early or late travel. The Peterborough, Grantham, and Retford stops of the intermediate Pullman trains should ensure reasonable patronage at all seasons.

Punctuality

THE ample diesel motive power of the "Master Cutler" and other fast trains makes them less liable to unpunctuality caused by traffic delays or engineering works. The fact remains, however, that most British expresses are very sensitive, as regards timekeeping, to any cause of delay on the heavily-trafficked main lines. Civil engineering works, largely in connection with modernisation, are undoubtedly a common cause of lateness; but recovery margins are allowed, and a great deal is done to inform the travelling public. It may be asked how far late running is caused by lack of judgment or even by apathy in signalboxes—or control offices, and by slack station working. Such matters are hard for operating officers to regulate, except through leadership and strength of personality. These qualities are necessary also in civil engineers and motive power officers, whose tasks, however, are made slightly easier because their subordinates are less, though not much less, dispersed.

Partitioning the G.N.R.(I.)

MUCH still has to be done by Coras Iompair Eireann and the Ulster Transport Authority before partition of the Great Northern Railway, which ceases officially to exist at the end of this month, is complete. In the Republic there is speculation as to the location of the headquarter offices in Dublin of the enlarged C.I.E. The present headquarters are at Kingsbridge Station, inherited from the former Great Southern & Western Railway, to the west of, and remote from, the business centre of the city. With the G.N.R. lines in the Republic C.I.E. has acquired commodious offices at Amiens Street Station, nearer the centre. Presumably it will be convenient to transfer thither at least some of the offices, including those of the Board and the General Manager; perhaps the opportunity

will be taken to re-locate the various departments. The future of Harcourt Street, a Dublin terminus of the former Dublin & South Eastern Railway, may be decided at the same time; traffic is sparse, and there is a case for closing the line to Bray—though many people would deplore the demolition of the handsome station buildings.

Operating the Dublin-Belfast Main Line

THE new railway boundary between C.I.E. and the Ulster Transport Authority will be, it appears, at or near the political boundary on the Dublin – Belfast main line, between Dundalk and Goraghwood, with suitable adjustment as regards operation and maintenance. For the time being no radical alteration in operating practice seems envisaged as regards passenger traffic, as appears from the winter timetable received earlier this week. The main problem is the ownership of former G.N.R. diesel multiple-unit trains and of other stock. As a temporary measure, the diesel "Enterprise" and other services could be operated, and motive power and rolling stock maintained, under existing Great Northern arrangements. What C.I.E. has acquired is virtually the southern end of the Belfast main line—which was shorn, last year, of most of its branches in Republic territory—and the Howth and a few other, minor branch lines. Whether there will be room at Amiens Street to deal with main-line passenger trains from the South and West is problematical; to run them to and from that admittedly central terminus would add to rail journey times, which might be commercially undesirable.

Advance of Railway Air-Conditioning

IN the past, when the railways of the world were faced with the need to raise their standards of operating efficiency and passenger comfort, they concentrated their attention upon the former. Until comparatively recently, railway administrations have tended to confine their efforts to increase passenger comfort to what have been termed the mechanical discomforts of railway travel, for example, inferior trackwork, poor riding, and insufficient upholstery. Uncongenial atmospheric conditions, dust and draughts remained, however, until full air-conditioning was evolved.

British industry has been prominent in supplying air-conditioning equipment to railways all over the world. Thus air-conditioned vehicles fitted with Stone-Carrier equipment today run on railways in more than 30 countries; over 1,000 sets are in use exclusive of U.S.A. installations. The first installation outside the United States took place in the 1930s in Australia. There are seven Government-owned railway systems in the Dominion and passengers travelling on five of them may do so in fully air-conditioned accommodation, in locomotive-hauled coaches or in diesel railcars. The Commonwealth Government Railways principal line, which runs from Port Pirie in South Australia to Kalgoorlie in Western Australia, carries some of the most luxurious trains and railcars in the world. They are fully air-conditioned and mainly employ the "head-end" power supply system. South Australian Government Railways, which radiates from Adelaide, operates jointly with the Victorian Railways a through service to Melbourne. The principal luxury trains on this run are the recently-introduced "Overland." The Victorian Railways, the pioneer of air-conditioned passenger stock in Australia, has no less than 53 air-conditioned vehicles (excluding joint stock with the South Australian Government Railways, totalling 18) and is able to run air-conditioned services on all main lines. The Queensland Government system now operates 69 air-conditioned cars powered by the "head-end" system. The first air-conditioned train, the "Inlander," went into service on the Townsville to Mount Isa run in February, 1953, others, including the "Sunlander," which runs from Brisbane to Cairns, rapidly followed. The New South Wales Government Railways also has a large number of air-conditioned cars.

Air-conditioned railway vehicles are now in public and private services in many parts of the African continent. The first application in Africa was before the last war in the Lourenço Marques system of Mozambique this was followed soon after the war by similar installations in the Union and Egypt. The "White Train" of South Africa is possibly the best example of an air-conditioned train supplied for private service. It was built by Metropolitan-Cammell for the Royal tour of South Africa in 1946, and consisted of 12 coaches, all air-conditioned, some of which now form part of the train of the Governor-General. Another Royal train fully air-conditioned, the fate of which is obscure, is that built by Fiat for ex-King Farouk of Egypt in 1952. Later, two cars built by Decauville for the use of the Emperor of Ethiopia on the metre-gauge Franco-Ethiopian Railway were completed, and in August last year a special car built by Sorefame for the state visit of the President of Portugal to Portuguese East Africa was placed in service in Mozambique. Another special air-conditioned vehicle is the saloon built for the Governer of Northern Nigeria by the Birmingham Railway Carriage & Wagon Co. Ltd. Unlike the preceding four vehicles which are fully air-conditioned, this car is equipped with compartment-type air-conditioners only in the lounge and bedroom.

Stock which is air-conditioned for public service in the Union of South Africa operates on the main-line between Cape Town and Johannesburg, and thence via Pretoria across the border to Lourenço Marques in Mozambique. The "Blue Train," covers the first part of this route, climbing from a sea level to 5,735 ft. in the course of its 956-mile journey. In Mozambique air-conditioned trains operate on the Beira Railway, connecting Beira on the coast with Umtali in Southern Rhodesia, and also on the Lourenço Marques Railway. The climate in Portuguese East Africa is generally hotter and more humid than in the Union, and the need for air-conditioning is therefore more marked.

This is in direct climatic contrast to the north African countries where humidity is very much less. The railways of Egypt, which are mainly confined to the more fertile areas of the Nile Delta, recognise their need for air-conditioning, and accordingly make use of air-conditioned trains between Cairo and Alexandria, Port Said, and Assuan.

On the west coast of Africa, air-conditioned trains for public service are at present running only in Angola, on the Lauanda Railway. The system operates railcars from Luanda on the coast to Melenge, which lies 225 miles inland to the east, 4,000 ft. above sea level, and has recently extended the line north-east to the Belgian Congo. In the latter territory trains with air-conditioned restaurant cars operate on the Bas Congo-Katanga system on the Tenke-Dilolo and Port Francqui-Leopoldville lines.

Railway air-conditioning in the British Isles, at present incorporated only in the Royal train, is planned for five diesel Pullman trains now being built for British Railways by the Metropolitan-Cammell Carriage & Wagon Co. Ltd., and shortly to go into service in the Western and the London Midland Regions. France is represented by the "Mistral," running between Paris, Lyons, Marseilles and Nice, and is probably the best-appointed locomotive-hauled train of the French National Railways; it is fully air-conditioned by Stone-Carrier, as is the equally well-known "ETR.300" of the Italian State Railways, one of the most modern and luxurious trains in existence, operating between Milan and Naples.

The recently introduced "Trans-Europe Express" diesel trains are also air-conditioned, and those operated by the Netherlands Railways in conjunction with the Swiss Federal Railways on the Amsterdam-Brussels-Luxembourg-Zurich and Amsterdam-Brussels-Paris routes of the network are equipped by Stone-Carrier. The first train to initiate this international service was built by Wegmann of Kassel in 1952, it made a successful tour from Munich to Athens and back, covering 3,700 miles on the lines of the German, Austrian, Jugoslav and Greek State Railways before entering upon its present daily service under the name "Comet" between Hamburg and Basle. A second such train has now been built, and while both are air-conditioned, only the first is equipped by Stones. All the

41 coaches of the German T.E.E. train sets were supplied by Lahmeyer, which firm has also been responsible for equipment for other rolling stock operating in Germany; these include the German Federal Railway *Gliedertriebtageszug* (light-metal day train), 10 sleeping cars for the German Sleeping & Dining Car Company; four two-car railcar sets and eight coaches for the use of the U.S. Forces stationed in Germany (the former since replaced with Brown, Boveri equipment); and 40 Wagons-Lits sleeping cars. The "Blauer Enzian" train of the D.B. is fitted with Brown, Boveri equipment. This manufacturer has also been responsible for one special coach operating in Switzerland and three coaches for Mocamedes (Angola).

Railway air-conditioning plays an important part in the trains of the warmer European countries of Portugal and Spain, and also in the much cooler ones of Norway and Sweden. On the Spanish (R.E.N.F.E.) and Portuguese Railways (C.P.) air-conditioned diesel train sets manufactured by Fiat are in service; they are proving popular, as are also the air-conditioned dining cars on the Norwegian and Swedish State Railways. A Swedish manufacturer, Svenska Fläktfabriken, has supplied equipment for 15 dining cars for the Swedish State Railways another four cars are to be fitted with the Stone system. In Jugoslavia Stone-Carrier air-conditioning equipment has also been fitted to the private train of President Tito.

In the continents of North and South America air-conditioning in all its forms is widespread. The Carrier organisation is prominent among suppliers of railway air-conditioning equipment in both the U.S.A. and Canada, but in the South American countries British equipment has been applied and trains featuring this make of air-conditioning are operating in the Argentine and Chile. One of the best-known trains so equipped for the Chilean State Railways is the "Flecha Del Sur," which operates between Santiago and Puerto Montt.

The railway network of India is the biggest in Asia and ranks fourth among the railways of the world. Air-conditioned stock operates in all of the six regions for first-class accommodation and there is a growing tendency for the service to be extended to lower class accommodation also. This is indicated by the success of the so-called "Gandhi Trains," the first of which was introduced last year. They are fully air-conditioned, even to what is in effect the third class accommodation, and represent an advance in railway travelling standards in India. Another well-known Indian train composed of air-conditioned stock is the "Frontier Mail" of the Western Railway, which operates between Bombay and Amritsar. In Pakistan, railway air-conditioning is supplied to the North Western Railway, and probably the best-known train so equipped is the "Khyber Mail," which operates between Peshawar and Karachi.

The Malayan Railway was one of the first administrations outside the U.S.A. to provide air-conditioned rail travel. Its main-line service operates from Singapore to the Thailand frontier and air-conditioning equipment is fitted to the passenger stock on both the east- and west-coast routes, Stone-Carrier air-conditioning equipment has also been supplied to the Thailand State Railways but not for its public vehicles.

A considerable proportion of the first, second and third class vehicles of the railways of Indonesia is equipped with air-conditioning, considered essential in such a hot and humid climate. Quite a different climate prevails in Iraq, and the need for air-conditioned accommodation is considerable. About 30 vehicles, dining cars, sleepers and lounge cars have been air-conditioned by Stone-Carrier.

The success that now attends the use of air-conditioning equipment emphasises the fact that the problems of maintaining the equipment are fully understood by the engineering staff of the administrations concerned. This state of affairs has only come about in the course of post-war years, and shows the realistic approach on the part of railway administrations throughout the world to the importance of increasing passenger comfort and maintaining revenue in the face of competition from other forms of travel.

Taking a Chance

WE have already made some editorial reference to Brigadier C. A. Langley's report on the serious collision which occurred on December 4, 1957, at St. Johns, Lewisham, and in the present issue will be found a summary of the facts and opinions set forth in it. The accident was the third worst for casualties to be recorded in the United Kingdom. The standing train had its brakes fully applied and suffered complete telescoping of a crowded vehicle. The derailment of the overtaking express, which had passed two cautionary colour-light signals and overrun one at danger and was still travelling at about 30 m.p.h., struck away a stanchion of the girder bridge carrying the Nunhead-Lewisham line; this caused two heavy girders to collapse and crush heavily-loaded coaches. By the alertness of its motorman a third train was stopped in time before any part of it could fall on the wreckage. Heavy fog and darkness made rescue work very difficult but it was carried out with exemplary efficiency. Civic services were supplemented by much valuable help from voluntary associations and many individuals. Circumstances fortunately are very different today from what they once were; a simple telephone message now sets in instant motion well-organised relief columns, with large material resources and hospital facilities at their command.

There was nothing wrong with the signalling, under which an exceptionally heavy traffic had been handled without a mishap of any consequence for some 30 years; no signalman or anyone connected with its working or upkeep acted incorrectly. Visibility was particularly bad at the approach to the site where, for clearance reasons, the signals were located between up and down lines. The preliminary caution and full caution aspects were indeed obscured by the fog until the boiler prevented the driver from seeing them from his side of the engine; but had he crossed the footplate or called the fireman to his aid he would have received the two warnings of the conditions ahead. Instead, he continued running, undoubtedly convinced that as he had never been stopped at St. Johns by the particular signal concerned, he would not find it against him on this occasion. It is, as Brigadier Langley says, hard to understand an experienced man taking a chance in this way, although other instances have been known; and Brigadier Langley finds himself obliged to place responsibility for the calamity on the driver alone.

As invariably happens, both railway and ministerial authorities received great numbers of suggestions covering A.T.C., radar and wireless devices, more powerful tail lights, "fog" services, and so on; many were entirely impracticable or based on erroneous assumptions. Those who propose the universal adoption of elaborate equipment, which in any case can only reduce the already small risk run by the railway traveller by a very small amount and must leave several potential causes of mishap untouched, nearly always fail to realise that such equipment cannot be installed and then be left to look after itself. To the very heavy installation cost must be added a continuous charge for efficient maintenance, without which the apparatus might prove useless just when most required.

Brigadier Langley was obliged, therefore, to comment at length on the question of A.T.C. and train-stops and emphasise the conditions governing their application, which are not identical on all types of line. He concludes that apparatus which gives an audible cab warning and brake application at an adverse distant or equivalent signal indication, the purpose of the British Railways A.T.C. system now in course of application, is "the best practicable aid to drivers in controlling their trains safely under all weather conditions," and that on ordinary main lines the cost of going further and adding a train-stop effect would not, when everything is taken into consideration, be justified. Experience has of course shown that such warning equipment is a great help to drivers of steam locomotives hauling heavy fast trains, and its generalisation is certainly to be welcomed. It is important to understand clearly what its limitations are and to realise that it cannot guarantee that every class of restricting signal aspect will

invariably be correctly respected. Although it is to be applied to begin with on manually signalled sections, the intention is eventually to use it also to re-inforce multiple-aspect colour-light signalling. Brigadier Langley is satisfied, however, that there is no need to modify the priorities already agreed on in the matter, or to alter the positions of the signals which were disobeyed at St. Johns.

He makes it clear that radar, as far as we now know it, can be of little value on the railway, where conditions differ totally from those obtaining on the water or in the air; and the uses of wireless as a safety device also are limited, for such positive functions as it might conceivably fulfil are more easily attained in other ways. It has to be remembered also that a railway cannot be continually changing its signalling methods, nor can it have, as regards certain vital functions, all sorts of differing systems in operation at the same time. Nevertheless, the possibilities offered by scientific developments, especially in the electronic field, need to be kept constantly in view, and this is indeed being done by the British Transport Commission. The collapse of the bridge, an unprecedented accompaniment of a collision, grievously increased the casualty roll, not to mention the serious dislocation of traffic to which it gave rise; but the lesson so hardly learned will be turned to account and, the report states, safeguards be introduced in future designs, where practicable, to reduce risk of such an occurrence should overbridge supports be struck accidentally.

Training in Locomotive Engineering

THE influence of the kind of early training received by a locomotive engineer on his subsequent career was one of several important topics discussed by Mr. R. Arbuthnott, Director, North British Locomotive Co. Ltd., in his Presidential address to the Institution of Locomotive Engineers last Wednesday.

There have been many changes in the methods used in selecting and training young engineers over the last 30-40 years. New features are the appointment of careers masters at schools, organised visits of schoolboys to engineering works, and aptitude tests. As to the practice of some industries of a year's pre-apprentice training, Mr. Arbuthnott believes this to be beneficial because it can help the apprentice to adjust himself and also obtain a wider appreciation of the broad engineering principles. The embryo trade apprentice instead of being put on production work at the age of 14, straight from school, now has the advantage of a further year there, followed by a year's pre-apprentice training at a works and at the employer's expense; apprenticeship proper does not start until the age of 16. This preliminary year at a works can, and should be, a most valuable year for the prospective tradesman, helping him not only to adjust himself to industrial life by easy stages but also to obtain a much wider and more intelligent understanding of engineering principles in general. It emphasises, however, the urgent need for additional teachers.

The importance of acquiring some personal skill in at least a representative selection of the various trades, as Mr. Arbuthnott points out, is great, as it creates not only a sense of satisfaction but also authority which cannot be achieved merely by watching others; it is also important to understand the basic principle behind whatever is being studied. His enlightened views on the subject of apprenticeship are shared, we believe, by the principals of most large engineering concerns. He praises the work of the many training schools he has visited in railway and other workshops in Britain, India, Nigeria and other countries, each doing a splendid job with a devoted staff and inspired leadership. His remarks incidentally reveal the closeness of the relations between the North British Locomotive Co. Ltd. and railways in not a few countries; and similar close relations are maintained, also largely by means of personal visits, by other firms supplying locomotives and other material to the railways.

A year in industry before taking a university course is an invaluable prelude to university life as most young engineers will admit; the graduate returns to the shops for his further training some time later, and picks up the practical side more quickly because of his more mature and critical brain. Although in many ways the two years of National Service are a serious interruption in the normal life of the young engineer, a valuable feature of the training period, which seldom includes useful technical training, is the broadening effect on the general outlook of each National Service candidate. This disruption of life, hitherto considered necessary in the national interest, seems to be coming to an end; but instead, he hopes that there will be keen support for the Territorial Army or organisations which encourage self-reliance and endurance.

There is every increasing contact between industry and the universities, indicating the realisation which firms in general have of the need for highly trained men; Mr. Arbuthnott sounds a warning that the locomotive engineering profession in its widest sense should not allow itself to be left behind in this competition for available brainpower, and let the best men be enticed to other professions. Also, because the general shortage of technically trained engineers is a national problem, definite steps should be taken to encourage young engineers and make life "attractive for them in this country," albeit without discouraging those of a pioneering spirit who wish to make their way elsewhere in the Commonwealth. Some experience of processing, planning, rate-fixing, and, if possible, contact with the cost accountant's department, is also advocated; and he stresses the importance of an economist's outlook on works problems. The works cost accountant should be accepted as one of the team.

Even now, he adds, when many countries are self-supporting in the production of railway equipment generally, there is still widespread interest in the policy and technical ability of British Railways and in the British locomotive industry, and he feels that the latter is still regarded as a leader in its particular field. He comments on the advantage which foreign competitors receive from their home railways compared with the situation which pertains in this country and makes a timely plea for closer co-operation from the British Transport Commission, particularly in greater practical and moral support of the home locomotive industry.

The war years created serious difficulties and railways everywhere have had a hard struggle to rehabilitate themselves in the face of material shortages and rising prices; moreover as a result of two world wars, overall purchasing policy has had to be reviewed with increasing emphasis on local manufacture both to overcome wartime restrictions and shipping difficulties and to satisfy an increasing national desire for industrialisation. An outstanding example of this cited in the address is the Chittaranjan Locomotive Works in India, with which Mr. Arbuthnott has had considerable personal association.

London Transport in 1957

GRATIFICATION that the London Transport Executive fully paid its way in 1957 for the first time since 1948 must be tempered by consideration that this was largely the result of the restriction on private motoring caused by petrol rationing early in the year after the Suez incident, and that the favourable conditions of 1957 no longer obtain. Indeed, circumstances at least in the immediate future are bound to be adverse for London Transport as for other public passenger transport, especially as regards traffic by road, partly as the result of the recent bus strike, which encouraged private motoring in central London, besides losing goodwill for L.T.E.—though this may be regained in time. The only comparatively normal year in which L.T.E. has fully paid its way—that is, in which all operating costs and the central charges of the British Transport Commission were met in full from the year's earnings—was 1948, the first year of nationalisation. The financial results for 1957, with an account of progress made on the L.T.E. Underground railway and on the road passenger undertakings are reviewed in "London Transport in 1957," a review of the

Executive's work, produced primarily for the senior staff of London Transport. This well-written and well-produced publication reached us earlier this week. In mid-September it is indeed late to consider the events of the preceding year; but in his preface Sir John Elliot, Chairman of London Transport Executive, maintains, not unreasonably, that last year, with petrol rationing, was exceptional and well worth recording; its story, he points out, shows that "the restricting influences and tendencies which have been at work in public passenger transport over the last decade were pulling at us still harder, and proving ever more difficult to solve." The traffic receipts rose from £78·6 million in 1956 to £83 million in 1957 and working expenses from £75·6 to £78·7 million. The traffic lost to L.T.E. is stated to be largely optional or pleasure traffic concentrated in the weekday off-peak periods and at weekends. In consequence, the gap between the volume of peak traffic, which is the most costly to carry, and the volume of other traffic is being progressively widened. The proportion of vehicles and crews to man them needed only in the peak hours is growing and the average mileage performed per vehicle is falling.

The report deals at considerable length with street congestion. Successful measures to improve and maintain regularity of bus operation include the Bus Running Control—squads of specially trained inspectors who supervise the running of complete routes or groups of routes in turn—and the Bus Electronic Scanning Indicator (BESI), which has been described in our pages.

Survey work and the preparation of detailed plans for the new tube railway, the Victoria Line, are proceeding, but a start on construction still awaits the availability of resources to finance it. Taken by itself, the line would not be financially profitable because of the considerable transfer of traffic from existing services, but it would attract much new traffic and also relieve road congestion; a 14-lane motor road would be needed to carry by car the same number of passengers as the Victoria Line could carry, assuming the present average load of 1½ persons per car and 1,500 cars per hour per lane. "London Transport in 1957" points out that the bus strike of May and June last demonstrated that the most effective method of moving people in large numbers into and out of a great city is an underground railway.

Mention is made in the review of railway developments reported and described in our columns at various times. The layout of the District and Circle Line track between South Kensington, Gloucester Road, and High Street, Kensington was revised to improve the running of the services. The new track arrangement was brought into use in July, 1957. Detailed planning of the scheme for quadrupling the Metropolitan Line to Watford South Junction and for electrification beyond Rickmansworth to Amersham and Chesham continued during the year. Preliminary work had also been carried out on the tracks between Bow Road and Upminster in preparation for the transfer from the Eastern Region of British Railways to London Transport of responsibility of operating and maintaining the local lines and for re-signalling them to London Transport standards.

During 1957, two of the three prototype tube trains ordered for the Piccadilly Line and incorporating important new features of design and construction were delivered and placed in service. Their introduction enabled older cars to be transferred to the Central Line to lengthen more trains on that line from seven to eight cars. Authority was given to order 248 new cars for the Metropolitan Line to replace the compartment stock; it was also given to order cars to enable all Circle Line trains to be lengthened from five to six cars, and to replace the old stock used for the Earl's Court to Olympia service.

Signalling improvements continued throughout the year. They included operation of a junction by "programme machines," first applied at Kennington in January last.

Scientific investigations were made into improved methods of de-greasing and cleaning metal components removed from bus engines and other units during overhaul at Chiswick Works, corrosion problems, metallurgical problems concerned with welding (including the welding of rails), stress-loading of motored axles of trains, and many other matters. Work on a new central laboratory at Chiswick should be started this year. Operational research was carried out in 1957 on *inter alia* passenger door control on the railways and railway line capacity.

In a letter to senior members of London Transport staff, accompanying the review, Sir John Elliot points out that "even the man or woman who now walks the shorter distances can be won back by good service, and there are many such. Ours is an old and famous transport system, and over all the years it has earned a fine tradition of service. The present difficulties are a challenge to London Transport and all who work for it. Let us accept it eagerly, and apply our long experience to doing the job to the satisfaction of the public and to ourselves."

Letters to the Editor

(*The Editor is not responsible for opinions of correspondents*)

The Norfolk & Western Railway

August 30

SIR,—You told recently how the Norfolk & Western Railway had ceased to be the last stronghold of the steam locomotive in the U.S.A. Like our former North Eastern Railway, the N. & W. is a great carrier of coal to industrial plants and for shipment, coastwise and overseas. In 1957 it handled nearly 60 million tons of coal and 18 million tons of other traffic on 2,130 miles of road. Coal originated on its lines, amounted to 11 per cent of the national output and 19 million tons were exported overseas from its piers at Lamberts Point, Norfolk. In the palmy years of the Northumberland and Durham export coal trade, the North Eastern frequently passed as large a tonnage over its staiths, but it had a short and easy rail haul in contrast to the N. & W. average distance of 300 miles through some difficult country.

No fault could be found with N. & W. operating in 1957. With an average wagon load of 51 tons, a train load of 2,614 tons and a train speed of 17·6 miles an hour, it worked 24,276 million ton-miles and became one of eight American railroads to exceed the volume of ton miles produced by our railways from 18,960 miles of road. Its output of ton-miles in a freight train hour was 48,195, about 50 per cent above the average productivity of all U.S.A. Class 1 railroads.

The N. & W. again resembles the old North Eastern in providing an ample supply of wagons. At the end of last year it owned 64,290 wagons with an average capacity of 61 tons. That was a larger number of wagons per mile of line than any other important railroad possessed. Of the total stock 47,700 were open hopper wagons and the N. & W. was able to lease 2,000 of them to the Pennsylvania Railroad. There is a financial link between the two railroads and the President and Vice-President, Finance, of the P.RR. are members of the N. & W. Board of directors.

The good fortune of the N. & W. ended at the turn of the year. In the first half of 1958 its freight revenue declined by 23 per cent owing to a fall in coal exports and a sharp recession in the coal mining, steel and motor industries. Though expenses were cut by 18 per cent, earnings (before charges) were 30 per cent down to $14·4 million and the operating ratio was 73·5 per cent against 62·2 last year. The Pennsylvania fared worse with decreases of 21 per cent in freight revenue and 16 per cent in passenger revenue, an operating ratio of 90 per cent against 85 and a deficiency of $12 million in place of almost $26 million earned at June 30, 1957. The deficit was over a million less than at May 31 and it is to be hoped that better wagon loadings will clear the balance off soon.

Yours faithfully,

R. BELL

Clacton-on-Sea

THE SCRAP HEAP

The Tay Bridge Locomotive

Assuredly Scotch railway locomotive builders can claim to produce a good article. This week the engine which hauled the ill-fated train in a gale of wind over the side of the Tay Bridge in 1879, with appalling loss of life, passed through Glasgow. Strangely enough, the only injury it received in the accident was the knocking off of the funnel, and that was due to the block and tackle snapping when the engine was being lifted from the bed of the river some months later. She is to be put on the Edinburgh and Glasgow route.—*From "The Financial Times" of August* 27, 1898.

[The bridge collapsed on December 28, 1879. The locomotive was North British Railway 4-4-0 No. 224, designed by Thomas Wheatley and built at the N.B.R. Cowlairs Works in 1871. It was recovered from the Tay in April, 1880, taken on its own wheels to Cowlairs, and repaired. In 1886, it was rebuilt as a four-cylinder tandem compound, but this was not successful; and in 1897 it was again rebuilt. The engine worked for some years between Glasgow and Perth, and later on the Border Counties line (Hexham to Riccarton). It was renumbered 1192 in 1913, and withdrawn from service in 1919.—ED. *R.G.*]

Last Enchantment

Now and again disturbing rumours reach me that Marylebone Station is to be closed. Heaven forfend that good Sir Brian Robertson should countenance such a deed of horror!

As Keats is called the poet's poet, so Marylebone is the stationmaster's station. Liverpool Street is its only rival as the last refuge of the pure railway spirit, and even Liverpool Street is sometimes afflicted nowadays by an unseemly bustle and unease. Contemporary scepticism taints her smoky air. Marylebone alone, of all that fair sisterhood, still keeps her spells and secrets inviolate. There the rare porter, grown old in his service, stubbornly refusing all offers of promotion to coarse Cup-Final-tainted St. Pancras or flighty cosmopolitan Victoria, still tells the folk-tales of his forebears round the black Victorian stove (Chadband's Patent "Duplex") in the porters' room, and polishes the ancient weighing machines with a traditional song on his lips.

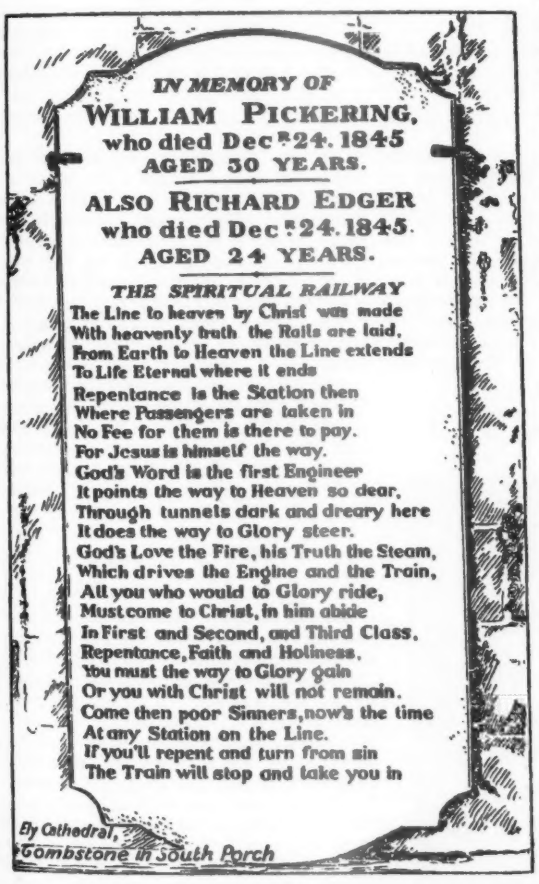
The Stationmaster himself must be a figure of truly awful majesty. I have never seen him, of course. Probably he appears in public only once a year, at the Stationmasters' Ball at Cannon Street.—*"Peter Simple" in "The Daily Telegraph."*

Backing on to the Depot

When I came to live in a house separated only by a hedge and a bank from railway property I visualised all kinds of disadvantages which have not materialised. There was one I forgot: the fact that to every small boy in the neighbourhood our garden is at the gates of heaven. . . . My son, of course, has been able to establish social superiority from his first day at school. In any argument of the "my Daddy's got a bigger car than yours" variety he can crush any opposition with: "We have trains practically *in* our back garden," and anyone attempting to fight back is annihilated with: "And not only trains, night sheds and marshalling yards and spare tunnel sections and a great big steam crane and a loud-speaker so that we can hear all the trains being told which sheds to go in and out of! . . ."

All the year round there are trains, old, new, long, and short, and a wilderness of lines and looming sheds. It is all magic to my son and his friends. They will remember the house by the railway with nostalgia in years to come, long after they have outgrown the fascination of trains, if they ever do outgrow it. "I suppose all you young men want to be engine drivers," said a patronising visitor. They regarded him scornfully. "Motormen" said my son.—*From "The Times."*

Railwayman's Memorial



Postcard illustration of a tombstone at Ely Cathedral, received from Sir Arthur Kirby, former General Manager, East African Railways & Harbours

Titular Values

(*See our September 5 issue*)

Poets often praise the beauty
And extol the charms of duty,
Whilst dilating on the dignity of work;
So much for divine afflatus,
What concerns me is the status
Of the chap still known to some as "just a clurk."
He has got to know a lot
Ere allowed to make a blot
Or to get himself entangled with a "classi";
He may go from town to town
Ere allowed to settle down
With a permanent position for his chassis.

Engine-drivers are technicians,
What the French call *mécaniciens*;
Without knobs and wheels they'd find things rather hard.
Shunters would be chasing doles,
Round the bend, or up their poles,
If they had to push their own trucks round the yard.
Even porters, so they say,
Show some diffidence today
In responding to the traveller in distress.
Doubtless this is all my eye,
But it crops up frequently
In the correspondence columns of the Press.

"Golden lads and girls all must,
"As chimney-sweepers, come to dust."
Thus Shakespeare tacks a query on to fame.
If we cheerfully get through
All that's here for us to do,
Will it matter very much what's in a name?

A. B.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Improved Conditions for Africans

On expiry of the Harragin Award on August 31, certain improvements in conditions of service for African employees were agreed at a joint industrial committee held in Bulawayo on the 20-21 August. The railway administration representatives were led by Mr. J. W. S. Pegrum, General Manager. The new arrangements apply with effect from September 1.

Delivery of Garratt Locomotives

Rhodesia Railways have now received all 46 of the "20th" and "20a" Beyer Garratt locomotives which were ordered 2½ years ago. The in service cost will be about £3,500,000. Altogether there are 60 of these locomotives based at Bulawayo, Livingstone, and Broken Hill. The last 40 to arrive were designated "20a" class; the main difference between these and the older locomotives being the size of the bogie wheels. Two of the locomotives have been fitted with an automatic train control device. Experiments with the equipment are to be carried out on the North line near Bulawayo.

VICTORIA

Gauge Conversion Progress

Bridge and culvert construction work for the standard gauge project between Melbourne and Wodonga has been speeded up. Considerable activity is in progress between Seymour and Wodonga. Sub-structures for 52 bridges are being constructed, and 10 culverts are also being built on this section of the north-eastern line. Twenty-five of the culverts have been completed.

The two largest railway bridges will span the Broken River at Benalla and the Ovens River at Wangaratta; most of the sub-structure work for the Benalla bridge is finished. It is planned to construct the single concrete pier in the river bed sometime in November when there is less risk of flood.

Camps for the standard gauge workers have been established at Seymour, Euroa, Benalla, Wangaratta, and Wodonga, and those at Seymour, Euroa and Benalla are now being extended. Others are in progress of being set up at Broadford, Wallan, Longwood and Chiltern. The labour force has been expanded to about 500, and when the new camps are ready for occupation it is expected that additional men will be engaged.

Building Over Railway Yards

Work will start in the near future on the erection of buildings over part of the railway yards at Flinders Street Station, Melbourne.

An agreement to roof the yards with 11 storey buildings was signed last May by the Victorian Railways Commissioners and the Victorian Employers' Federation. The area to be covered is that at present occupied by Princes Bridge Station and will be 660 ft. long facing north and 118 ft. long facing west.

Princes Bridge is an eastern extension of the main suburban terminal at Flinders Street but on a higher level. Northern suburban traffic is handled there.

The station consists of the usual offices, and a roofed island platform with a track on either side ending at buffer stops. There is no through running. The project will involve demolition and remodelling of the present station, which will be sunk to a lower level so that trains can be run through to Flinders Street; tracks will be lowered 20 ft. and platforms 16 ft.

When this is done a concrete slab will be laid over an area of 60,000 sq. ft. and a series of limit height buildings erected over the top of the slab. Provision will be made for parking 600 motorcars.

The cost of lowering the railway tracks and platforms will be £468,000 which will be borne by the Employers' Federation. The area will be leased to the Federation for 98 years, after which time the entire structure will revert to the Victorian Railways.

The cost of the entire project will be £7,500,000. It is planned eventually to develop the whole Jolimont railway yards area in a similar way.

WESTERN AUSTRALIA

Cool-Storage Vans

The first four of an order for eight all-steel vans to be used on the State Railways have recently been placed in service after successful trials. They are bogie-type cool-storage vans constructed in the railway workshops at Midland Junction and designed for the carriage of butter, milk, meat and other perishable items.

The first four vans will be used between Perth and Robbs Jetty for meat traffic, and between the Metropolitan Area and Kalgoorlie, Meekatharra, Bunbury and Boyanup for perishable traffic generally. Each van has two side compartments fitted with meat hooks and also removable flooring to facilitate cleaning. Ice is packed in a central container which serves both compartments.

The total capacity of each van is over 31 tons and when fully loaded its gross weight will be 54 tons. The remaining four vans of the order are nearing completion in the workshops and will be brought into use in the near future.

UNITED STATES

Lack of Standardisation

Recently the Purchases & Stores Division of the Association of American Railroad undertook an investigation of the economies which might be effected by U.S.A. railways if there were a greater degree of standardisation in their purchases. For example, although 78 per cent of the tonnage of steel rails bought in the last five years has been of five heavy sections, rails of no fewer than 43 different sections in all, ranging from 65 to 155 lb. per yd., figure in railway specifications, which means that the rail manufacturers have to stock rolls for all of them.

There is scope for a very considerable reduction in this variety of sections, and

New Wagon Shop for Rhodesia Railways

New wagon shop for the Chief Mechanical Engineer, Rhodesia Railways, in Bulawayo Works, in last stages of completion

this in its turn would reduce the number of parts needed for rail joints, the variety of rail fastenings, and so on. Substantial economies might also be effected if the railways were prepared to standardise one common type of 50-ton box wagon. The changes proposed in this report, if implemented, would, it is calculated, produce a total saving of $18,000,000 per annum.

Missouri-Kansas-Texas Reorganisation

The Interstate Commerce Commission has approved the reorganisation proposals of the Missouri-Kansas-Texas Railroad, generally known as the "Katy Lines." It is completely to eliminate its accumulated unpaid dividends on its preferred stock, amounting to a total of $110,722,830. The I.C.C. has, however, laid down some stringent conditions.

For all preferred stock surrendered to the company, the Katy is to exchange debentures, cash certificates and common stock of corresponding value. The I.C.C. conditions also lay down that the railway shall establish a sinking fund for the cash certificates that will absorb 20 per cent of the available income remaining after the payment of debenture interest, and that a contribution, if earned, amounting to 0·5 per cent of the total debenture issue, shall be paid into another general sinking fund to provide for future eventualities. The M.K.T. Lines comprise 1,787 miles of M.K.T.RR. trackage, and 1,449 miles of operated subsidiaries.

FRANCE

New Second-Class Couchettes

The S.N.C.F. is introducing a new type of second-class *couchette*. These coaches are the longest passenger stock in use in France, 82 ft. 4 in. in length. They provide sleeping accommodation for 60 passengers in 10 compartments. Heat and light are under the control of the passengers themselves. Windows are fitted from the outside instead of the inside, to facilitate maintenance.

Remote Control for Shunting

The S.N.C.F. has been carrying out tests with a remotely-controlled 650-h.p. diesel shunting locomotive. It has been found possible to achieve full speed control over the range of 0-25 m.p.h. and for reversing. Voltage is tele-transmitted to the locomotive by means of a hertzian transmission. Instructions in reverse can be transmitted similarly and these can be sent when the locomotive is in forward motion without any special precautions; safety devices enable the necessary operations to be carried out automatically. In the near future it is hoped to add apparatus to detect objects on the track; this will be by means of an induction device which automatically engages the shunting speed of 1·25 m.p.h. when the locomotive is about 30 yd. from the obstacle.

EASTERN GERMANY

Electrification

The first electric train to enter Leipzig Main Station for 13 years recently inaugurated the new electrification from Leipzig to Dessau. Before 1945, several routes radiating from Leipzig were electrically worked, but the installations were dismantled in 1945-46 on the orders of the Russian occupational authorities.

NORWAY

First Train Ferry to Denmark

What is reported to be the first train ferry to ply direct between Norway and Denmark was inaugurated recently, between Kristiansand, in southern Norway, and Hirtshals in northern Jutland. The service is worked by a Norwegian-built vessel, the *Skagen* ("The Skaw"). The ship is stated to accommodate six railway vehicles (presumably bogies) and 45 motor-cars, or 100 motor-cars without railway vehicles, also 600 passengers. The speed is 18 knots, and the voyage takes 4 hr.

Publications Received

Railways of Britain. By Cecil J. Allen. Edinburgh: Thomas Nelson & Sons Limited, Parkside Works. 7¼ in. × 5 in. 136 pp. 31 pp. plates. Price 7s. 6d.—Within the compass of a comparatively small book, the author gives a concise review of the development and chief features of the British railway system from the early years of the last century to the present day. Chapters are devoted to big bridges, long tunnels, and other outstanding engineering works; the achievements of the steam locomotive, particularly in the races to Scotland of 1888 and 1895, and with the high-speed trains of the 1930s; and the underground railways of London. An outline is given of the grouping period, and the story ends with a review of the nationalised system of today. An appendix contains tables of the tunnels, large stations, summit levels of over 1,200 ft., non-stop journeys of more than 150 miles, and fast runs in 1939 and 1957-58.

The Development of the Railcar, by R. W. Kinder. Lingfield, Surrey: The Oakwood Press, Bucklands, Tandridge Lane. 7¼ in. × 4¾ in. 56 pp. Illustrated. Price 6s. 6d.—This booklet, No. 12 of the series of "Locomotion Papers," is a re-issue of a short history of the railcar in the United Kingdom and Ireland, first published in 1939. In spite of the corrected and additional text and further illustrations, this remains primarily a catalogue of steam, petrol and diesel railcar prototypes, up to the War. The recent decision to use diesel railcars on a large scale on British Railways is barely mentioned. The photographic reproductions are interesting, but it seems unfortunate that the many black-and-white sketches could not have been drawn with more detail and accuracy.

Visiting British Timken.—British Timken, of Duston, Northampton, has published a 36-page booklet which gives details of the products of the company and its subsidiaries. A copy will be supplied to each person visiting the factory in the future. The booklet affords a good general impression of the range of bearings produced and the manufacturing processes involved.

Small Fans and Blowers.—This booklet, No. 41, describes the current range of Tornado fans and blowers manufactured by Keith Blackman Limited, Mill Mead Road, London, N.17. To assist in the location of a fan for a specific purpose each is labelled to show its size and type, whilst relevant duty tables give capacity details and the duty range. Leading dimensions are also included. Copies may be obtained on application to the company.

Rotary and Control Switches.—The range of types RS and RC rotary and control switches manufactured by Ferguson Pailin Limited, Higher Openshaw, Manchester, 11, is illustrated in a 28-page catalogue which has been issued. Complete ordering references are given for standard switches with ratings up to 60A., 250 V. and 30A., 440 V., a.c. and d..c. Copies of the catalogue may be obtained on application to the company.

Teleprinter Network.—This 16-page booklet describes British Road Services London teleprinter centre and nation-wide teleprinter service. It is fully illustrated and contains information about the development and future plans of the network, the working of the system, and the functions of the London centre. The booklet is being distributed to traders and manufacturers all over the country to encourage firms to make greater use of the teleprinter service.

Distillers Plastics Group Publications in French.—Four booklets in French have been published by British Resin Products Limited and British Geon Limited, companies in the Distillers Plastics Group. These contain basic information on the three groups of products manufactured by B.R.P. and on the P.V.C. materials and nitrile rubbers manufactured by British Geon. Copies of these publications can be obtained on request from The Information Department, Distillers Plastics Group, Devonshire House, Piccadilly, London, W.1.

Stockport Road Bridge Reconstruction, L.M.R.

Four separate 122-ft. skew concrete box-girders, one under each track

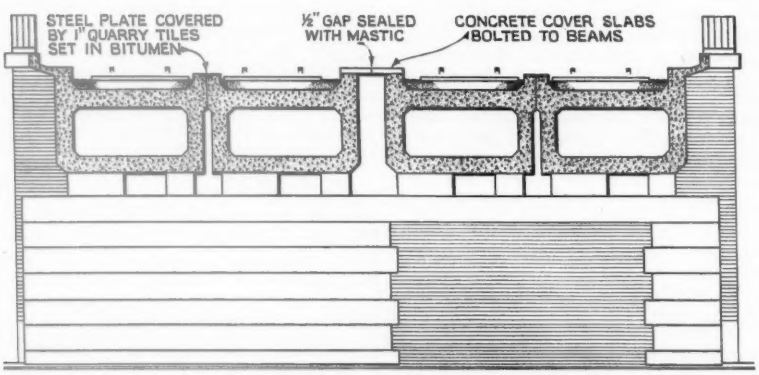
THE bridge carrying the London Midland Region four-track main line between Stockport and Manchester, London Road, over Stockport Road, recently completed, was briefly described in our issue of July 4. As, however, the design and sitework have several features of special interest calling for rather more detailed description, they are dealt with below.

The general design of the superstructure will be noted from the illustrations. The cross-section shows the four concrete box-girders or beams, each weighing about 500 tons and composed of 16 pre-cast blocks, each weighing 30-35 tons and measuring 13 ft. 3 in. in width, 8 ft. 7 in. in length and 7 ft. 6 in. in depth with 1 ft. 4 in. upstands. Actually, owing to the skew at which the railway crosses the road, the blocks vary slightly in shape. They are also designed to give each beam a slight camber. The use of such large blocks saves time and minimises interference with train services.

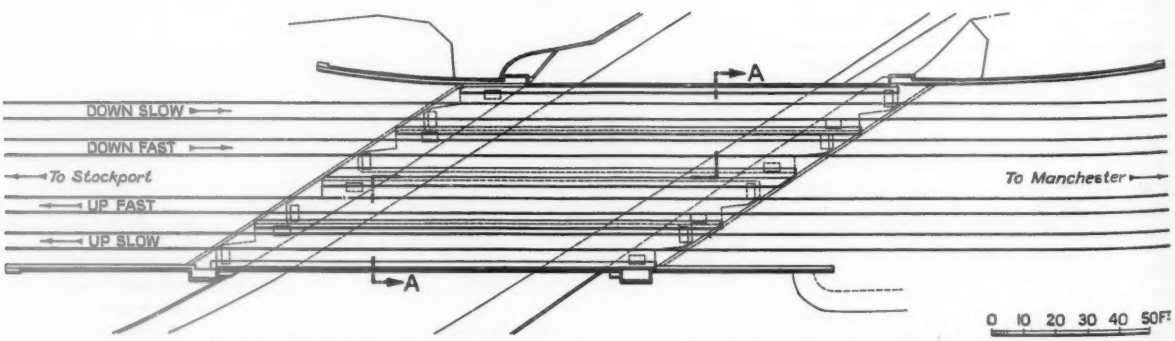
Each of these box-girders independently carries a track, and has a clear span between abutments, thus dispensing with the masonry piers and cast-iron columns of the old bridge—mentioned in an editorial note on another page—and provides improved road clearances.

The plan of the bridge shows that it is on an acute skew necessitating staggering of the bearings under the ends of each box-girder span. The span between the inner bearings is 107 ft. and that between the outer bearings 139 ft.; each bearing is under a web of the box-section. Structurally, therefore, each beam acts as if it were supported at four points with considerable uplift forces at the outer bearings and much increased reactions at the two inner bearings. These uplift forces are somewhat less than they would be in a continuous beam because of the twist they produce; but as a box-section is very rigid in torsion, the relief from this cause is only of the order of 10 per cent. As it was not practicable to provide the holding-down forces at the outer bearings which would have been required, the beam was so designed that by adjusting the levels of the bearings, practically all the dead load, approximately 670 tons, is carried on the outer bearings. This initial reaction is available as a holding-down force for the applied live load of 350

Post-stressed concrete beam before being placed on its bearings seen on left. Special outer bearing with cage-cradle on extreme left



ENLARGED SECTION A.A.



Section and plan of Stockport Road bridge showing concrete girders or beams and skew respectively

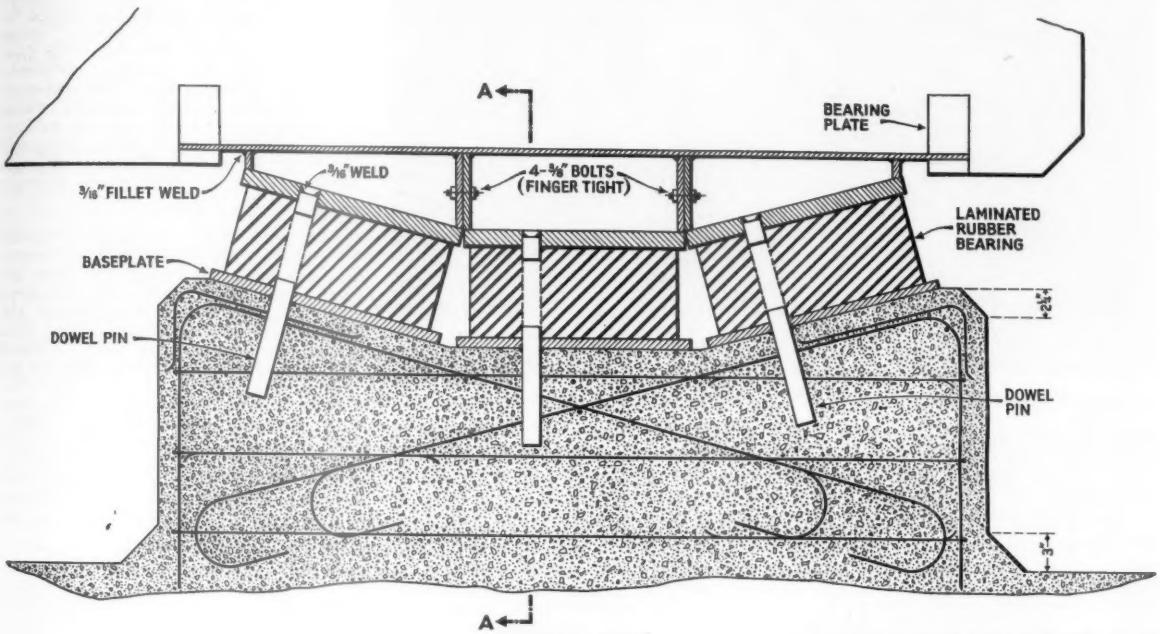
tons. At the full-load stage the total load on the inner bearings is 530 tons.

Bearings

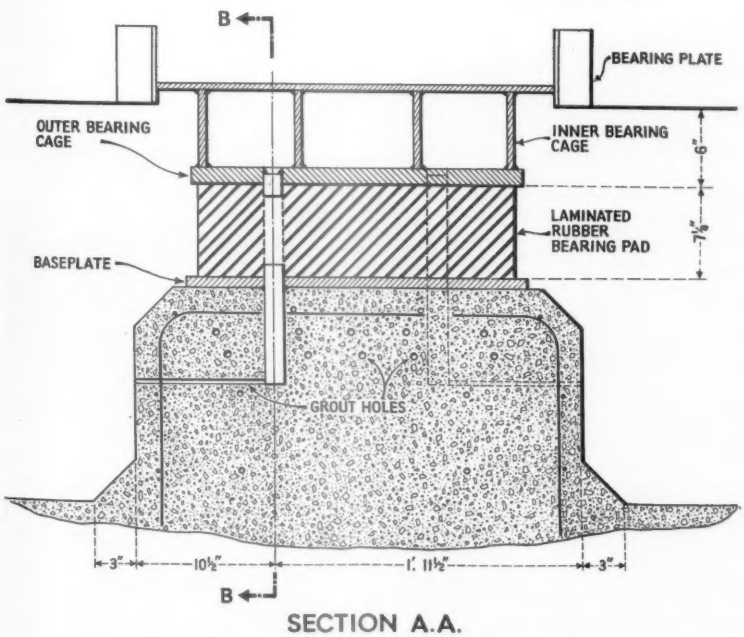
The bearings themselves are made up of alternate layers of rubber and steel. Their deflection, and also possible errors in setting their levels, were considered in the calculation of the reactions, and allowances were made for all probable variations. It will be seen from the illustrations that a special design has been evolved for the outer bearing to counter any tendency to transverse thrust, caused by the lateral forces from the locomotive. The bearing consists of a central horizontal rubber-and-steel block between two inwardly-inclined side blocks; the latter provide for the side-thrust and convert it to a vertical reaction on the abutment. On all three blocks rests a cradle or group of cages carrying the girder bearing-plate. It is shaped to bear on the three blocks and is fabricated so that one cage rests on each block. The cages are bolted together to finger-tightness only to allow them to bed down into the bearing plates capping the blocks.

Girder Fabrication

The pre-cast concrete blocks required for each beam in turn were erected on a stage spanning the highway and built alongside the existing bridge. As brought to site, each row of blocks was placed on the stage with 8-in. spaces between blocks. In these spaces, connecting diaphragms were cast in reinforced concrete; the reinforcement was necessary because the change of direction of the post-stressing cables takes place only at the diaphragms.



SECTION B.B.



SECTION A.A.

Sections through special type outer bearings

Post-Tensioning and Erection

The post-tensioning of each of the independent girders was effected with 16 Magnel-Blaton cables, each cable containing 72 wires 0·276 in. in dia. and giving a total pre-stress force of 3,600 tons. At and near the centre of each girder the cables lie side-by-side in a trough in the lower chord of each block; but at the ends of the span they are concentrated in two vertical groups, one on each side of the end blocks for tensioning.

The finished beam was jacked down and rolled—transversely to the track—across from the erection stage on to temporary reinforced concrete trestles sited between the staging and the final position of the span on the abutments. There the beam was jacked down so that the whole load rested on the outer bearings, enabling the difference in level at the positions of the inner and outer bearings to be checked and the packings in the rubber bearings on the abutments to be adjusted accordingly, so as to give the desired reactions. Each box-girder beam was jacked up and rolled across to be lowered on to the prepared bear-

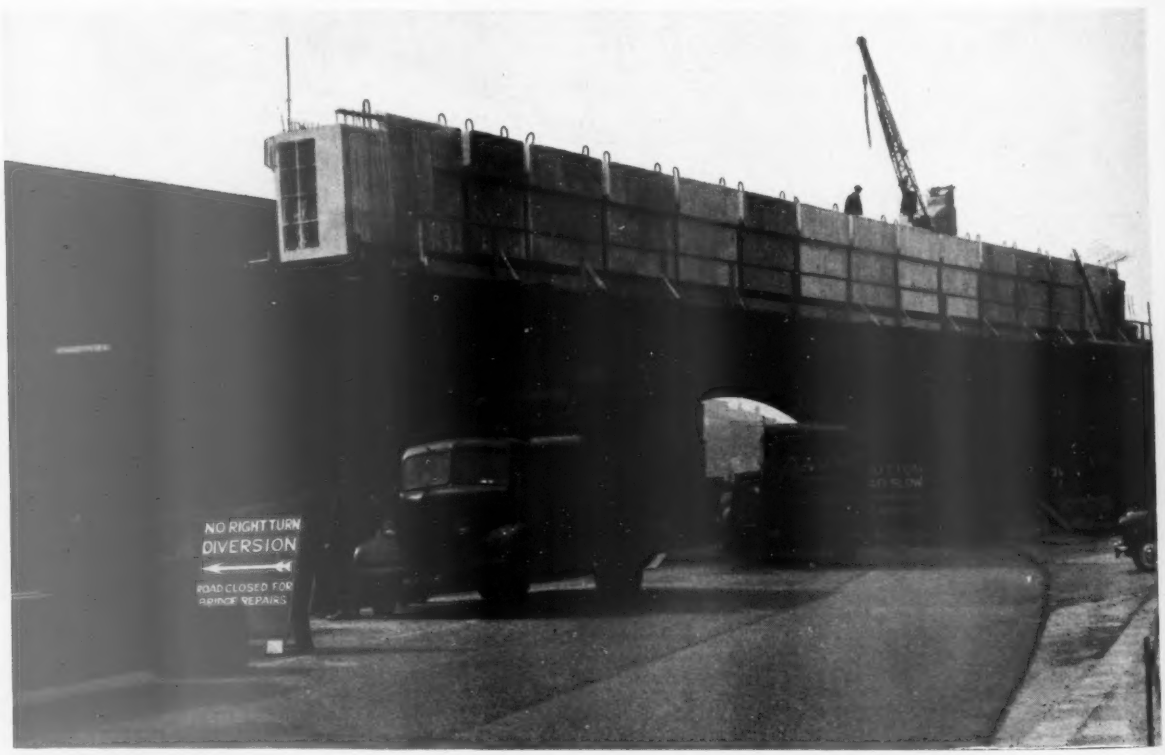
(Centre) first beam in position and almost ready for track, (left) second beam assembled with partly-cast diaphragms, and (right) former track supported on way beams

ings, in place of the temporary way-beam span carrying traffic during site-work on the concrete beams; this was was carried out at week-ends.

The whole of the work has been carried out under Mr. J. Taylor Thompson, Chief Civil Engineer, London Midland Region, British Railways, and the design was prepared in the Regional Bridge Office under the direction of Mr. F. Turton, Assistant Engineer (Bridges). The main contractors are Leonard Fairclough Limited, who have employed Stressed Concrete Design Limited, to prepare the detail drawings and calculations for the post-tensioned beams, and Anglian Building Products Limited, to manufacture the pre-cast units. The rubber bearings are being supplied by the André Rubber Co. Ltd.

LONDON TRANSPORT STATION GARDENS COMPETITION.—The platform garden at Stoke Mandeville station on the Metropolitan Line has been judged the best entered for the annual London Transport station gardens competition this year. The silver challenge cup is awarded to Porter-Signalman A. Sanderson. The stations in the competition, which has been running since 1921, are divided into five sections, the best garden in each section competing for the challenge cup. The team of judges was headed by Sir John Elliot, chairman of the L.T.E.

B.T.C. FILM WINS AWARD AT VENICE FESTIVAL.—A British Transport Commission colour film, "Between the Tides," has been awarded first prize in the educational category of the Venice Film Festival. The film, which runs for 22 min., shows some of the plant and animal life to be found by the tourist and holiday-maker on the West Coast of Britain. It is directed by Ralph Keene, produced by Ian Ferguson, and photographed by Ronald Craigen. The commentator is Stephen Murray, and Edgar Anstey is the executive producer for the British Transport Commission Films Service. The film has been produced to stimulate travel and is available for exhibition.



Concrete block units on erection stage ready for casting of diaphragms between them

Storm Damage in the Southern Region

Landslips disrupt rail services in the London Eastern and Central Districts

THE violent thunderstorms which swept across South-East England on the evening of September 5, accompanied by torrential rain, caused widespread damage to railway property, and serious interruptions to Kent suburban and main-line, and Brighton main-line services, in the Southern Region of British Railways.

Observations of the storm were made at a meteorological station at Harrow, Middlesex, and in one hr. between 8 p.m and 9 p.m. the recorder picked up 1,470 lightning flashes within a radius of 10 to 15 miles Observers at the station described it as "probably one of the most spectacular storms of the century."

Earthslips, flooding, interrupted communications, electrical defects on trains, and other obstructions were widespread in the London Eastern and London Central Districts of the Southern Region. In contrast, London West District escaped comparatively lightly.

The majority of the damage was in the nature of earthslips blocking either the up or down lines, or in some cases both. Blockages were caused at 21 different locations in the London Eastern District, and at 18 locations in the London Central District. The most serious was at St. Mary Cray and between St. Mary Cray and Swanley, and at both ends of Sevenoaks Tunnel. Both the up and down line was blocked between St. Mary Cray and Swanley, and it was not until 4.45 p.m. on September 7 that both tracks were clear. Floodwater rushed through Sevenoaks Tunnel with such force that it carried with it large quantities of earth and ballast. Traffic over these sections was not resumed until the Monday morning, September 8, and even then severe speed restrictions had to be enforced.

Landslip at St. Mary Cray, showing temporary repair work in progress

Flooding or earthslips also interrupted services on the Portsmouth line between Haslemere and Liphook and between Liss and Petersfield. At Clockhouse Station, Beckenham, flood waters rose 2 ft. above the tracks, and passengers were directed from Clockhouse to Beckenham Junction. Lightning struck the Reigate stationmaster's house and a signalbox at Sanderstead, Surrey. Lightning also caused signal failures and railway officials had to resort to the "time interval" system of controlling trains on the East Grinstead and Tunbridge Wells line.

Consolidating earth at foot of embankment after landslip at St. Mary Cray

London Eastern District

Major earthslips occurred at or between the following places in the London Eastern District:

Blackheath and Charlton, Erith and Slade Green Crayford and Bexley, Albany Park and Sidcup, Sevenoaks and Weald, Bickley Junction and Petts Wood Junction, St. Mary Cray and Swanley, Fawkham, Fawkham and Sole Street, Otford and Bat & Ball, Bat & Ball and Sevenoaks, Shoreham (Kent), Greenhithe, Gravesend Central, Blackheath and Kidbrooke, Dunton Green and Polhill, New Eltham and Albany Park, St. Mary Cray Station, and Dunton Green and Chevening Halt.

In the London Central District the Brighton main line was completely blocked by a fall of chalk between Coulsdon North and Earlswood. Trains were diverted via Redhill, but were further delayed by six trees which fell on the line between Salfords and Horley.

At Reigate there was a suspected subsidence of the line accompanied by flooding which persisted until early on the Saturday morning, September 6; the line was reopened at 6.20 a.m.

Major landslides in the Central District occurred at or between the following places:

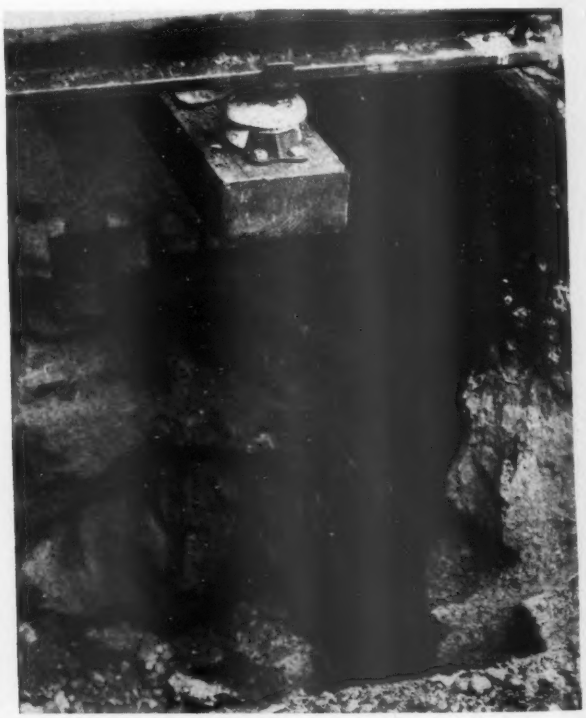
East Grinstead and Ashurst Junction, Penshurst and Edenbridge, Cowden and Edenbridge Town, Forest Row and Hartfield, Gomshall and Guildford, Quarry Line, Woldingham and Oxted, and Hurst Green Junction and Lingfeld. The line was also flooded at Morden Road Halt, Horsted Keynes, and Dorking North, and between Reigate and Redhill, Brockley and Honor Oak Park, Purley and Kenley, and Caterham and Purley.

Several hundred passengers waited at Charing Cross Station during and after the storm. Soon after midnight it was announced that a train scheduled to run to Hastings which had been standing in the station for more than an hour, would reach Hastings via East Croydon and Redhill and would come back to

Earth being cleared after landslip at Sevenoaks on the main line to Dover via Tonbridge

Mechanical shovel loading earth in wagons at the south east entrance to Sevenoaks Tunnel

Subsidence after flooding at St. Mary Cray Station, on the section now being quadrupled



Deep cavity with steep sides adjacent to the platform at St. Mary Cray Station

Tonbridge. Passengers who were waiting for a train to Tonbridge were advised to take the Hastings train to their destination. Further announcements informed passengers that trains could not be run beyond such points as Mottingham and Beckenham Junction. Some 1,300 passengers were stranded all night at Victoria Station. Special buses were arranged for some, but long distance passengers were allowed to sleep in the trains and waiting rooms, and refreshment rooms were kept open all night. The late arrival of Continental passengers presented special problems, and free refreshments were provided to the extent of 1,600 sandwiches, 700 cakes, 140 pork pies, 900 cups of tea, and 1 gal. of squash.

Emergency Services

On Saturday, September 6, emergency steam and diesel shuttle services operated between coastal stations and Tonbridge or Chatham. Passengers were then conveyed by available electric services or emergency bus links. As clearances were effected it was found possible to operate some Hastings-Charing Cross services via Redhill and the 3.26 p.m. Ramsgate to London Bridge also ran via Redhill, whilst the 8.35 p.m. Victoria to Ramsgate ran via Sidcup.

Earth being cleared from the line after a landslip at Blackheath

Alternative arrangements were also made for the cross-channel services. The Ostend services ran via the Redhill or Bexleyhealth line, the Calais and Boulogne services were in the main diverted to and from Newhaven, and the Dunkerque night ferry service operated to and from Dover; the connecting trains running via the Bexleyheath line.

Debris at the entrance to Sevenoaks Tunnel caused by flooding on the line

Suburban Electric Services

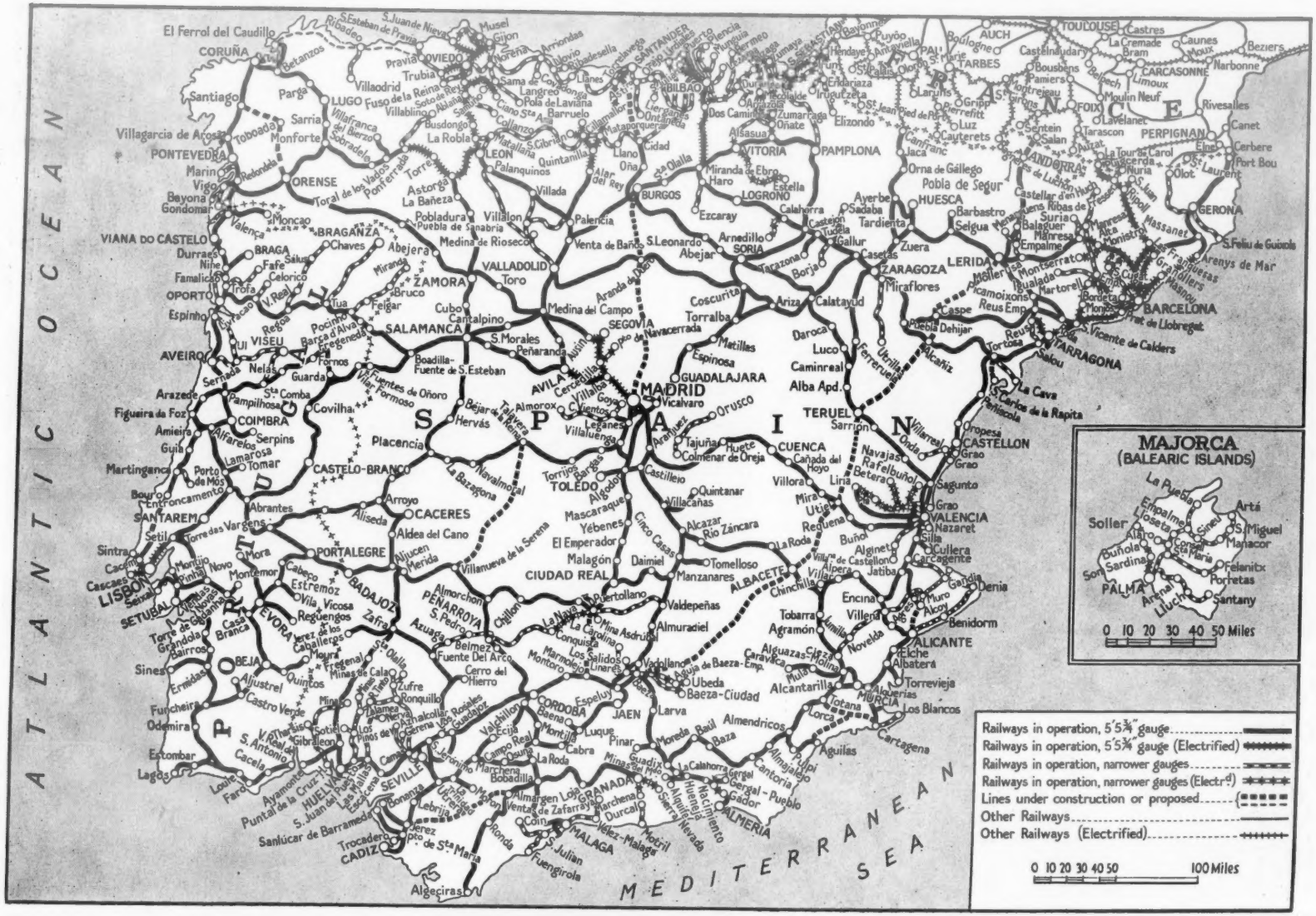
Normal services ran on September 6, on following routes:—Via Greenwich; via Bexleyheath; London Bridge-Bromley North; Charing Cross-Sevenoaks; Charing Cross-Hayes; Charing Cross-Tattenham Corner; Victoria-Orpington; and Holborn Viaduct-West Croydon.

On the London Central District the electric services between Charing Cross and Cannon Street and Gillingham were augmented to assist in clearance of passengers for Kent Coast services who transferred to and from steam services at Chatham and it was reported at 4 p.m. that all these passengers had been cleared; this clearance was assisted by passengers from Kent Coast stations circulating via Ashford and Hastings.

Shuttle services and emergency buses were utilised for varying periods and the diversion of Continental boat trains from Folkestone and Dover to Newhaven caused further reaction to the train working.

On Sunday, September 7, 20 London and Kent Coast services via Chatham and 12 via Tonbridge were cancelled. The remaining coastal services were worked as follows:—Victoria-Kent Coast services diverted via Bexleyheath or Dartford Loop Line; Charing Cross-Kent Coast services diverted via Redhill or Oxted except where terminated at Tonbridge in the up direction: Charing Cross-Hastings, diverted via Oxted; Victoria-Folkestone or Dover trains diverted via the Dartford Loop, and the Continental services run via the Bexleyheath Line.

By Monday, September 8, all routes were reopened to traffic with the exception of the Westerham Branch.



The railways of Spain

R.E.N.F.E. welcomes XVIIth International Railway Congress

THIS year, the tenth under its general rehabilitation plan, the Spanish National Railways system is to act as host to the XVIIth International Railway Congress which takes place in Madrid between September 28 and October 7 next. Delegates from 105 railway systems in over 50 countries together with representatives of 10 railway-associated bodies will be present. An indication of the scope of the Congress and of the interest directed to it is given by the fact that countries as far distant as Japan and Brazil will attend. Discussion will take place on problems of repair and maintenance, the use of very long rails, the design and improvement of railcars and multiple-unit diesel trains, goods handling, the difficulties inherent in a change-over to electric or diesel traction, the advantages of high-speed electronic apparatus, financial aspects and, with special relation to light railways, the effects of wear and tear and the reduction of operating costs.

The importance of the International Railway Congress, which meets in a different country every four years, is attested to by the status of the delegates who attend its meetings. In practically every case the national railway administrations are represented by the chairman, general managers, or other equivalent highest officers of the systems. They are attended by their principal chief technical officers with specialised knowledge of the matters which have been selected for discussion. Apart from the period of the Congress, a great deal of assiduous work is performed in the preparatory stages by highly qualified reporters, who assemble the material which provides the basis for the papers presented. Not the least valuable feature of gatherings of this kind, it need hardly be added, is the opportunity it affords of informal and frank exchanges of views on matters of common interest among railway officers who are brought together in an atmosphere of mutual consultation.

The object of each Congress is to facilitate the progress and development of railways, and there is no doubt that this year's session will act as a crucible from which many new and valuable future developments will emerge. Representation covers so varied a section of the world's railways that the information which will be exchanged, and which has been based on experience gained during the past formative five years, is bound to stimulate development. The world's largest system—the State Railways of the U.S.S.R. with its 120,000 route-miles—will be represented, as will be the world's most intensively-operated network, British Railways. Delegates will come from nearly all the Commonwealth countries and from many others besides. In Spain, they will find much of absorbing interest, for the natural geographical difficulties and varied conditions of the country have resulted in the application of almost every type of motive power and the solution of many difficult problems.

Much water has flowed under Spanish bridges since the first visit of the Congress to Madrid in 1930. Then, with the railways in the hands of private companies, very little had been done to exploit the traffic resources of the country. An article in this section sets out the reasons for this neglect. It is sufficient here merely to state that, on its formation in 1941, R.E.N.F.E. inherited an unprecedented legacy of almost total desolation. As a result of successive rehabilitation plans, of which that now in progress is but the latest, Spanish railways have undergone a considerable transformation and today R.E.N.F.E. possesses the fundamentals of a modern and efficient system. Although representing by far the greater proportion of the railways of Spain, R.E.N.F.E. does not hold a monopoly of rail transport in that country. There are in addition nearly 50 privately-owned systems with lengths open for traffic of from three to 212 miles—many of these are electrified.

The pages which follow contain a message from Señor Agustín Plana, the Chairman of R.E.N.F.E. and the President of the Local Organising Commission in Madrid. Full details of the Local Organising Commission follow. They precede a number of specially-written articles, two signed by senior officers on the R.E.N.F.E. system. Señor Alfredo Crespo, Vice-Manager, R.E.N.F.E., and Chief of Research & Reconstruction, writes on permanent way renewal. Señor Jose Fernandez Prida, Vice-Manager of the system and Chief of Way & Works, describes problems met in bridge renovation and maintenance Other articles deal with signalling on R.E.N.F.E. and present a broad record of progress achieved and future plans.

Delegates to the Congress will have an excellent opportunity of seeing the manner in which solutions have been found to problems closely associated with an extremely difficult terrain from the railway construction and operating points of view. The progress which has been made on Spanish railways in comparatively recent times has been truly remarkable. In many instances, R.E.N.F.E. has developed vehicles particularly suited to its own operating conditions. Formations such as the TALGO and TAF trains are certain to arouse great interest in a concentration of railway specialists such as that which will be assembled at Madrid next week. Those whose memories of Spain extend over the last quarter of a century cannot fail to be deeply impressed with the great progress which has been made in many directions. This is all the more commendable when consideration is given to the physical and financial difficulties which successive administrations of R.E.N.F.E. have had to overcome.

Notwithstanding the grave shortages of essential materials and the prevalance of conditions producing a constant increase in costs of all kinds, technical developments compare very favourably with those of countries which, relatively considered, might be judged as more fortunately placed. Various factors have contributed to the easement which now is apparent in the Spanish situation, but none of these detracts in any way from the very real achievements of R.E.N.F.E. By carrying out their work with such success, R.E.N.F.E. officers and administrators have made a vital contribution to the solution of a main problem in the Spanish national economy.

In recent years, Spain has enjoyed a well-merited and constantly-increasing reputation for tourism in many parts of the world. The scenic attractions of Spain, together with the traditional courtesy of its people, combine with an intriguing blend of modernity and a picturesque past to provide natural magnetism for the holidaymaker. These assets, valuable though they are in themselves, would count for little without the support of a well-organised national transport system. If those responsible for this vital aspect of the tourist industry were not fully aware of the need to co-operate in the matter, great and lucrative opportunities would be lost. Because of the clear-sighted outlook of the R.E.N.F.E. organisation, development proceeds along sound lines of Spanish tourism.

Don Agustín Plana Sancho, President of the Local Organising Commission in Madrid of the Seventeenth International Railway Congress, is Secretary of Public Works in Spain and Chairman of the Board of R.E.N.F.E. Señor Plana was born on December 11, 1889. In 1912, he attained the rank of Artillery Lieutenant at the Academy of Segovia with the title of Army Industrial Engineer. He soon distinguished himself in his studies and by his work in chemistry and metallurgy, becoming Professor of Chemistry at the Academy of Artillery and, later, Head of the Metallurgic Laboratory of that service. Subsequently, Señor Plana devoted his time to the iron and steel industry, in which he became Director of Engineering at Altos Hormos de Vizcaya steelworks. In the course of his professional career, he has given numerous speeches and lectures, in Spain and in other countries. He has published several books and articles, one of which won a Gold Medal from the Royal Academy of Science. He has attended numerous scientific and technical international congresses, and is a Member of several non-Spanish professional societies, among which are the Société Française de Metallurgie and the American Society for Metals. In recent years Señor Plana has directed the Department of Railway Material in the Ministry of Public Works as well as the Iron and Steel Institute of the Higher Council of Scientific Research in Spain. He has served on the board of R.E.N.F.E. since 1946, and has been Secretary of State at the Ministry of Public Works since 1957. His decorations include the Grand Cross of Civil Merit, the Cross of Isabel La Católica, the Cross and Badge of St. Hermenegildo and of Naval Merit, and the Red and White Cross and Badge of Military Merit.

Message from Don Agustín Plana

After 28 years, we again have the honour of receiving the International Railway Congress in Madrid. We are heartily glad to welcome our colleagues and friends, who are Delegates of the Governments and Administrations of participating countries.

My best wishes to them all for the efficiency of these meetings and especially concerning the technical interest of their conclusions for the life of the railway.

With regard to their stay among us here, I hope they will be able to appreciate the progress which has been made in the direction of national reconstruction. I hope, too, that they will enjoy the natural beauties and art treasures of Spain.

May I wish them all a cordial welcome.

Agustín Plana

Under-Secretary of Public Works, and
President of the Local Organising
Commission of the Seventeenth International
Railway Congress

Local Organising Commission

The Local Organising Commission of the Seventeenth International Railway Congress, which is taking place this month in Madrid, is made up as follows:—

President

Sr. A. Plana, Secretary of Public Works and Chairman of the Board of R.E.N.F.E.

Vice-Presidents

Sr. P. Lorenzo, General Director of Railways, R.E.N.F.E.
Sr. J. M. García-Lomas, Deputy Chairman of the Board of R.E.N.F.E.

Executive Committee

Sr. J. M. García-Lomas (President).
Sr. A. Krahe, Chief Engineer, Ministry of Public Works (Vice-President).
Sr. J. M. Puig-Batet, Director of the Board of R.E.N.F.E. and Manager of the system (Vice-President).

General Secretary

Sr. J. Pérez-Pozuelo, Civil Engineer, Ministry of Public Works (assisted by Sr. J. de Lasala, Chief Engineer, Research Service, R.E.N.F.E.).

Don Pascual Lorenzo Ochando, Vice-President of the Executive Committee of the Local Organising Commission in Madrid of the 17th International Railway Congress, was born in Albacete in 1910. After completion of his engineering studies in 1935, he entered Government service in 1940. Since then he has been working with the Second Region of Railways Planning & Building. He has been responsible for the construction of several important lines, including the Lérida-Pobla de Segur line opened in 1951. He is a founder member of the Board for Railways Planning & Junction Works and has played an outstanding role in many studies, particularly those relating to the solution of junction problems at Reus-Tarragona, Valencia, Bilbao, Madrid, and Segovia. In 1955, he was appointed Technical Secretary of the Ministry of Public Works, a position which he held until 1957, when he was promoted to his present position of General Director of Railways, Tramways & Road Transport, Señor Lorenzo also is a Vice-President of R.E.N.F.E.

Don Pascual Lorenzo
Vice-President of the Executive Committee

Don José M. García-Lomas y Cossio, President of the Executive Committee of, and a Vice-President of, the Local Organising Commission in Madrid of the 17th International Railway Congress, was born on October 9, 1896, in Madrid. Señor García-Lomas completed his studies as a civil engineer in 1920 and was appointed Engineer to the former Northern Railway of Spain. As a Director-Engineer on this railway, he was in charge of the electrification of the Pajares Pass and of the planning and carrying-out of the important electrifications of Barcelona, San Sebastian and Bilbao districts. He later became a member of the first official commission of electrification and Chief Engineer of the Operating Department of the Northern Railway of Spain. He held that office until the creation of R.E.N.F.E. in 1941. Shortly afterwards, he became Vice-Manager of the new system. In 1945, the Government appointed him General Director of Railways, Tramways & Road Transport, an office which he held for six years. At that time, he also was President of the Higher Council of Railways & Road Transport and Chairman of the Board of R.E.N.F.E. On giving up the General Directorship in July, 1951, he was appointed Director of R.E.N.F.E. In May last year, he was promoted to be Deputy Chairman of that system. Señor García-Lomas also is Professor in the Technical School of Civil Engineering. He is the author of various professional publications and a treatise on railway operation. His decorations include the Grand Cross of the Order of Civil Merit and the Cross of an Official of the Belgian Crown. In 1930, together with Señor Krahe, he undertook the office of General Secretary of the Organising Commission of the 11th International Railway Congress, held that year in Madrid. The Congress which takes place next week, and which is the seventeenth since its inception in 1885, will thus be the second to be held in Spain.

Señor Augusto Krahe Herrero, a Vice-President of the Executive Committee of the Local Organising Commission in Madrid of the Seventeenth International Railway Congress, is Chief Engineer of the Spanish Ministry of Public Works. Señor Krahe was Secretary-General of the Western Railway Company, Administrator of the Madrid, Zaragoza & Alicante Railway Company, and Director-General of the Madrid Tramway Society. He also has been Director-General of Technical Education in the Ministry of Education. At present, Señor Krahe is head of the first Bureau of Railway Studies & Construction at the Ministry of Public Works, as well as Vice-President of the Compania Auxiliar de Ferrocarriles of Beasain and of Air-

Don José M. García-Lomas
President of the Executive Committee

Señor A. Krahe
Vice-President of the Executive Committee

Señor J. Puig-Batet
Vice President of the Executive Committee

Don José Pérez-Pozuelo
Secretary-General of the Local Organising Commission

Conditioned Carriages Limited. He has been President of the Communications & Transit Commission of the League of Nations in Geneva and is a member of the directing committee of L'Union Internationale des Transports Publics in Brussels.

Señor José Puig-Batet, a Vice-President of the Executive Committee of the Local Organising Commission in Madrid of the Seventeenth International Railway Congress, was born in Barcelona on December 21, 1896. His secondary education and training as an industrial engineer was obtained at the Escuela Especial de Ingenieros Industriales, in Barcelona. He completed his studies in June, 1919. In the same year, he became an engineer of the Maquinista Terrestre y Marítinia of Barcelona, a firm concerned with metallurgical construction in general, where he formed part of the steel constructions study group. As the firm was at the time beginning construction of the first large steam locomotives to be built in Spain, Señor Puig-Batet later played an active part in the introduction of this new kind of construction to Spain. On August 1, 1922, he joined the Compañía de Madrid a Zaragoza y Alicante (M.Z.A.), beginning work as an engineer attached to the Barcelona division. He remained with this company until the formation of R.E.N.F.E., and at present occupies the position of Director of R.E.N.F.E., which he assumed on June 1, 1957. Previously, he had served as Director of the Fifth Zone. Señor Puig-Batet has lectured at the Escuela Industrial in Barcelona. In 1955, he took part in a study visit to the United States with the purpose of studying the working methods of United States railways. He has been decorated with the Order of Civil Merit.

Don José Pérez-Pozuelo, Secretary-General of the Local Organising Commission in Madrid of the Seventeenth International Railway Congress, was born on June 19, 1902, at San Sebastian. After qualifying as a civil engineer in 1925, Señor Pérez-Pozuelo practised on his own account and took part in various important public works such as the construction of the railway from Baeza to Utiel. In 1931 he entered the Civil Service and was posted to the Public Works Department in Granada, where his activities included work in the local railway district. In 1940 he was put in charge of the State-owned railway to Sierra Nevada, and planned and carried out notable improvements to that line. His project for a telfer-line as a solution of the problem of the approach to the mountains was adopted and he was awarded a decoration for his services in this connection. In 1935, Señor Pérez-Pozuelo was posted to the Department of Railways, Tramways & Road Transport in Madrid, where he is still employed. His appointment as Secretary-General of the Congress Organising Commission was made on the proposal of the Director-General of Railways by Government Order presented by the Ministry of Public Works on October 31, 1957. Señor Pérez-Pozuelo has been a member of various delegations representing the Ministry at international congresses and organisations, particularly in Geneva in the Transport Division of the United Nations Economic Commission for Europe.

Señor Jesus de Lasala
Deputy General Secretary of the Local Organising Commission

Señor Jesus de Lasala, Deputy General Secretary of the Local Organising Commission in Madrid of the Seventeenth International Railway Congress, is Chief Engineer of the Research Service of R.E.N.F.E. Señor de Lasala was born in Huesca in 1907. He completed his mechanical and electrical engineering studies in the Instituto Católico de Artes e Industrias in 1929. On January 1, 1930, he joined the Compania de Caminos de Hierro del Norte de España, and was appointed to the Way & Structures Division, first in the Design & New Constructions Service and, later, in the Fixed Installations Service. On the formation of R.E.N.F.E., Señor de Lasala became Superintendent of the Way Workshops. He continued to hold this position until 1948, when he became head of the studies section of the Council of Administration, since when he has specialised in economic, organisational, and documentation studies. At present, Señor de Lasala is a Deputy-Head of Department and Deputy-Head of the General & Economic Studies Bureau. He has represented R.E.N.F.E. at a number of international conferences and on several committees and working parties of the International Union of Railways (U.I.C.). He is Editor of the Spanish edition of the Documentation Bulletin of the U.I.C. and a member of the Documentation Committee of the Spanish National Institute for the Rationalisation of Work. In 1956, with five other R.E.N.F.E. officials, Señor de Lasala spent four months in the United States under the I.C.A. technical assistance programme studying the applications of operational railway research. Señor de Lasala holds a licentiate in mathematical science and for many years was a lecturer in geometry. At present, he lectures on Projects & Designs at the Instituto Católico des Artes e Industrias. He has published two geometrical textbooks and numerous articles on railway, economic, and operational research subjects in Spain and other countries.

R.E.N.F.E.—Its History, Aims, and Rehabilitation Plan

State ownership a financial necessity to a railway network decimated by neglect and political upheaval

INTEREST in railway construction in Spain was awakened in the first years of this century by British capitalists and engineers, and George Stephenson himself visited the country and reported on proposals to construct a Royal Northern Railway.

In 1843 a concession was granted for the construction of a line from Barcelona to Mataró, a distance of 18 miles. Its first engineers were Joseph and William Locke and the contractors were Mackenzie and Brassey. This line was opened on October 28, 1848, and proved financially successful. It was followed in 1851 by a line 30 miles long from Madrid to Aranjuez, and work was begun in the north on another to connect Sama de Langreo with Gijón. Although the success of the Mataró line gave encouragement to investors, comparatively little English capital was forthcoming and support for the building of the principal routes eventually came from France and, to some extent, Belgium.

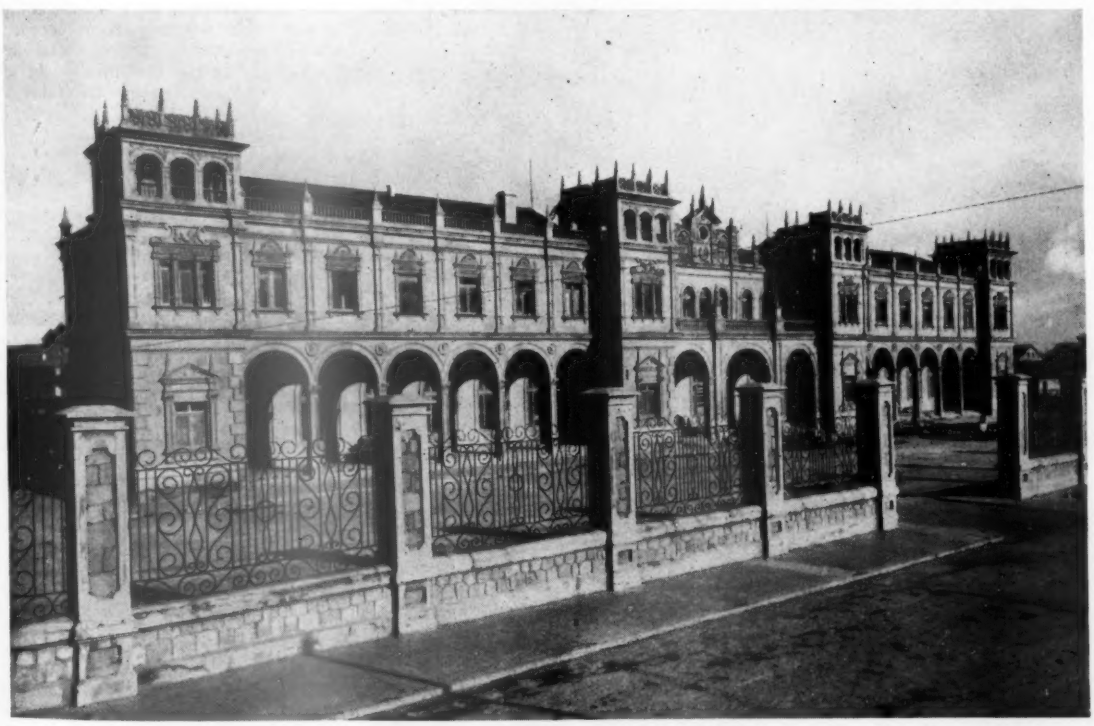
Great natural obstacles caused construction to be both costly and slow. In the ten years from 1847 to 1856 some 600 miles of line were built, but in the next decade the figure was over five times as great. Although subsequent progress was very slow about 9,260 miles were open to traffic by 1923.

Progress of Amalgamation

By a process of amalgamation and consolidation the greater proportion of the lines came under the ownership of the Northern, Madrid–Zaragoza–Alicante and Andalusian companies, with the Madrid Caceres and Portugal Company as the next in importance. The remaining lines were controlled by several companies financed by French, Belgian and British capital; the Great Southern and Zafra–Huelva lines, totalling 216 miles, were the best known in British hands, with a few others serving mining interests.

Financial results were not encouraging and those who had worked so hard to provide modern means of communication, often in very discouraging conditions, met with no real adequate reward. The State was obliged to assist with subventions and guarantees and, in 1877, comprehensive railway law, designed to place matters on a sound working basis, was enacted. The war of 1914, industrial unrest, and steadily-rising costs of labour and materials greatly affected the fortunes of the railways. In 1924 legislation was passed to enable the State to provide new capital for improvements but benefits expected from this were partially neutralised by road competition and other factors.

During the civil war of 1936-39, much rolling-stock was lost and damage caused to fixed equipment, bridges, stations, tunnels, and other works. The position became so grave that the State had to assume control of the three principal companies, operating 86 per cent of the 5-ft. 5¼-in. broad-gauge lines standard in Spain. Complete transfer was not effected until 1943, by which year all broad-gauge lines, totalling about 7,580 route-miles, had been unified. This total is in addition to the 100 miles of line already under State ownership. Although the narrow-gauge lines were not nationalised the law provided that a council be set up to co-ordinate rail and road transport interests. There are now some 2,760 route miles of narrow-gauge railway. The majority of Spanish lines are single; double track totals about 1,265 miles. The name chosen for the unified State system was Red Nacional de los Ferrocarriles Españoles, shortened to R.E.N.F.E. for convenience and used generally in notices and publications.



Spanish National Railways new station at Zamora, the starting point of the direct route to Santiago via Orense, to be completed this year. The architecture is in a traditional Spanish style

The first task of the new organisation, which is an individual corporate body with its own economic life intended to be administered on business lines, was to make good as rapidly as possible the damage and loss sustained during the civil disturbances and re-establish normal train services and other facilities.

Scarcity of Materials

Difficulties were very considerable. The work was hampered by the scarcity of materials which followed the 1939 war and by dependence on the restoration of normal conditions in industrial circles which took some time to effect.

Despite these problems, it was possible to proceed with certain works already in hand when that war broke out, the completion of which would do much to alleviate the situation. Among these was the electrification of the line between Madrid, Avila, and Segovia. This section is of great importance not only to the development of the suburban services to the north of the capital, but to the improvement of running on the most-densely worked part of the main line to Irún, Hendaye, and the French railway system.

The first part of this reconstruction work may be regarded as having been finished in 1945. It then became necessary to draw up a comprehensive plan covering the whole system in all its aspects and to find means of providing the necessary finance. Traffic was now once more increasing. Not only was it imperative to find means of carrying it but the growing needs of home industry, which was being stimulated to enlarge its scope, had to be met. At the same time, attention must be directed to the application of every technical development promising a means of reducing costs. Working was to be rationalised to the maximum extent. The large-scale introduction of electrification and dieselisation offered considerable possibilities in this respect. Plans were accordingly elaborated and estimates prepared for this and other essential work. Improvements envisaged included stronger permanent way, better signalling, more convenient stations, and more efficient marshalling yards.

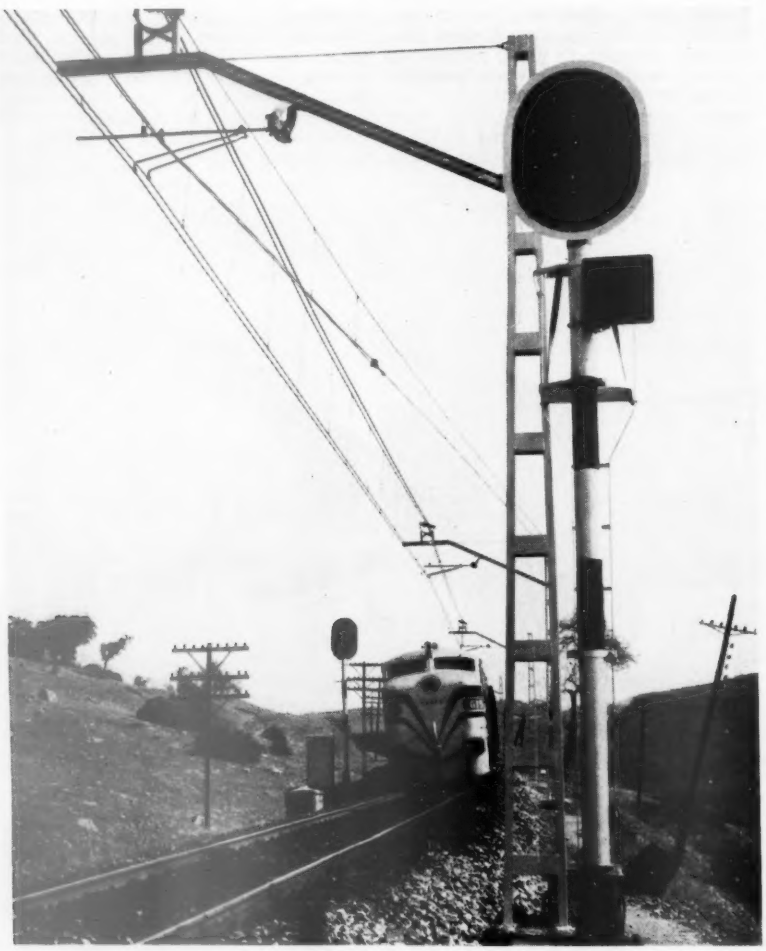
Between 1945 and 1949 an attempt was made to commence this more extended task, but prevailing economic restrictions confined activity to the development of a five-year plan. The estimated cost of this—1,500 million pesetas—was quite insufficient to cope with the demands of the situation. The period from 1949 onwards falls into two recognisable phases. During the first, development of the general plan proceeded under fairly stable economic conditions despite delays in the delivery of materials and equipment. In the course of the second, changes in prices and conditions necessitated a reconsideration and amplification of the scheme.

In thus simplifying the situation, the erroneous impression might be gained that these railway capital requirements were something new. On the contrary, they form part of a continuous process. If the matter is considered over a relatively long period (back to the turn of the century, for example), it will be seen that the railways always have absorbed an appreciable proportion of the nation's resources.

During the first 20 years of the century the old companies, able still to count on remaining in possession of their concessions for an appreciable term, could go on the market regularly for new capital. It may be disputed whether, considering the standards of construction followed when their lines were built, they went far enough in this direction; the capital invested often had been inadequate to ensure adequate improvement of their systems. Coupled with the concessions was the mistaken idea that the railways were finally complete when their working commenced, and that subsequently it remained necessary to establish the amount of effort and expenditure to maintain their value at that level. This thinking acted adversely on the raising of new finance. Nevertheless, the clear-sighted and careful management exercised by the old undertakings enabled them to obtain about 15,200 million pesetas during the years 1900-20.

The deterioration in the position evident during the 1914-18 war arose from the need to handle increased traffic, with consequently greater wear and tear on rolling-stock, track, and other equipment, combined with the impossibility of obtaining renewals from abroad and sufficient fuel. Changing economic conditions and strikes adversely affected the fortunes of the companies. Great opposition was raised against any attempts to alter rates and fares, even within the limits authorised by concessions. This was another cause of investors' disinclination to provide new money.

The years immediately following the 1914 war were full of anxieties for the companies. Adjustment of wage rates was accompanied by many serious difficulties which led the State to oppose an increase in rates and fares. The situation was met by grants for specific purposes and a policy of greater government intervention in railway affairs was thus



Diesel train running over an electrified single line

initiated. The grants made included new capital for the 3,000 V. d.c. electrification, completed in 1924, of the Ujo-Busdongo section over the Pajares pass. This work produced excellent results both for the Northern Company and for the nation.

After intensive debate in Parliament and Press the so-called Railway Law was passed in 1924. This placed State participation in railway affairs on a proper legal footing and provided an adequate organisation to deal with the situation. Capital was provided, under certain defined stipulations for essential new works and a sum of 23,200 million pesetas was made available from 1920 to 1930.

From 1930, with the changed political conditions and ensuing disturbances, this beneficial process ceased. Little or no additional capital was forthcoming, while damage suffered before restoration of normal working was very great. During the next 10 years only some 773 million pesetas was invested. The position gradually improved, particularly after 1946, although, in the 15 years up to and including 1955, amounts allocated to the railways did not equal the average for the period 1920-30 and were inadequate to meet requirements either of the railways themselves or of the expanding industrial economy.

Rehabilitation Plan

The general rehabilitation plan, in effect a continuation of the five-year plan referred to above, was elaborated by R.E.N.F.E. in 1948 under the direction of Count Guadalhorce. Approval was accorded on May 20, 1949, in a decree authorising the raising of 5,000 million pesetas as a first step towards the restoration of services. The gap between the original plan and further necessary projects was thus bridged. A subsequent rise in prices necessitated the issue of a further decree on February 22, 1952. This covered some 12,711 million pesetas, to be taken up at the yearly rate of 1,400 million pesetas. Experience gained during the first six years of working (up to the end of 1955) made it clear that further action was required and additional estimates accordingly were prepared and approved by a decree of December 9, 1955.

This sanctioned an extra 11,000 million pesetas. Of this sum, 1,600 million was to be devoted to completion of the plan covered by the 1952 decree and the remainder was allocated to the various detailed continuation works also involved. In round figures this money was distributed as follows:—

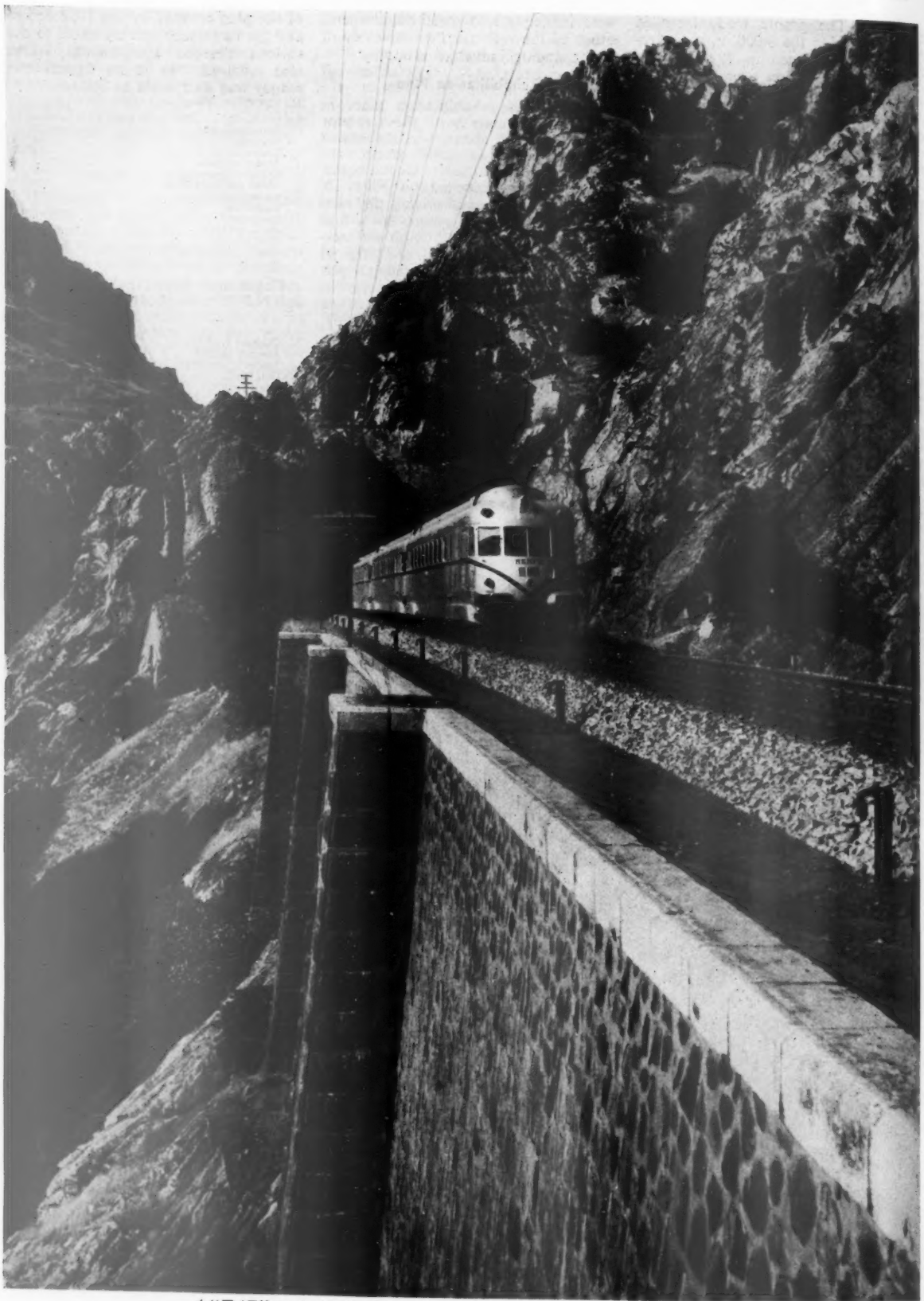
	pesetas in millions
Permanent way	2,000
Stations	1,368
Locomotives	623
Motor coaches	1,175
Other rolling-stock	1,988
Sheds and workshops	459
Communications	94
Signalling	286
Electrification	1,848
Road vehicles	6
Staff housing	50
Cost of Capital Issue	900
Bank credits (Export-Import)	265

Debentures issued as a charge on R.E.N.F.E. amounted to:—

	pesetas in millions
October 1, 1946	300
January 1, 1948	350
January 1, 1949	300
October 1, 1949	600
April 1, 1950	400
January 1, 1951	500
April 1, 1951	900
January 1, 1952	450
April 1, 1952	950
October 1, 1952	300
January 1, 1953	1,400
January 1, 1954	1,800
January 1, 1955	1,800
January 1, 1956	2,000
January 1, 1957	2,000

These issues enjoyed exemption from tax.

An English Electric electric locomotive of 3,300-*h.p., and* 3,000 *V. d.c. hauling a freight train through the Pajares Pass on the Gijon-Leon line,* 4,500 *ft. above sea level*



A "TAF" train in the Despeñaperros Pass, Spanish National Railways

Maintenance, Strengthening, and Replacement of Bridges on R.E.N.F.E.

Comprehensive programme of bridge renovation and maintenance: Many new structures built and in hand

By Jose Fernandez Prida,
Vice-Manager, R.E.N.F.E., and Chief of Way & Works

LINES operated by R.E.N.F.E. total 8,273 miles, seven of which are accounted for by a mountain line of electrified metre-gauge track. Apart from this, the standard Spanish gauge of 5 ft. 5¾ in. is in use throughout. There are 1,641 steel structures on the system and 4,945 masonry bridges. There are also numerous overbridges. These, for the greater part, are not maintained by R.E.N.F.E.

The Spanish Code of Practice for the calculation of steel bridges dates from 1956. The train rest which is called for by this Code is carried out by two locomotives with a Bissel axle of 18-ton load and four coupled axles of 25 tons. These haul their corresponding eight-wheel tenders of 22-ton axle-load and an indefinite series of eight-wheel wagons of 22-ton axle-load. The weight per ft. run is 3·55 tons for the locomotive, 3·28 tons for the tender, and 2·4 tons for the wagons. The effect also must be considered of three 30-ton axles separated by 4 ft. 11 in.

The Code of Instruction refers to permanent load, overload of train-type, wind stress, braking, a difference of temperatures of ±63 deg. F., side impact, centrifugal force, and dynamic effects in accordance with Instruction regulations. Resultant stresses for different materials are multiplied by 1·6 for spans of more than 131 ft. and by 1·5 for smaller spans, provided that all loads are superimposed. The product of stresses multiplied by the factors of 1·6 or 1·5 must be less than elastic limit of material used. Sag and alternate efforts must be considered in accordance with prescribed formulæ. Minimum thickness of each material must be $\frac{5}{32}$ in.

The same regulations apply in checking older bridges, and running of modern rolling-stock is permitted provided only that the strains to which the structure is subjected are not higher than 10 per cent of that calculated in the Code.

Five Bridge Classifications

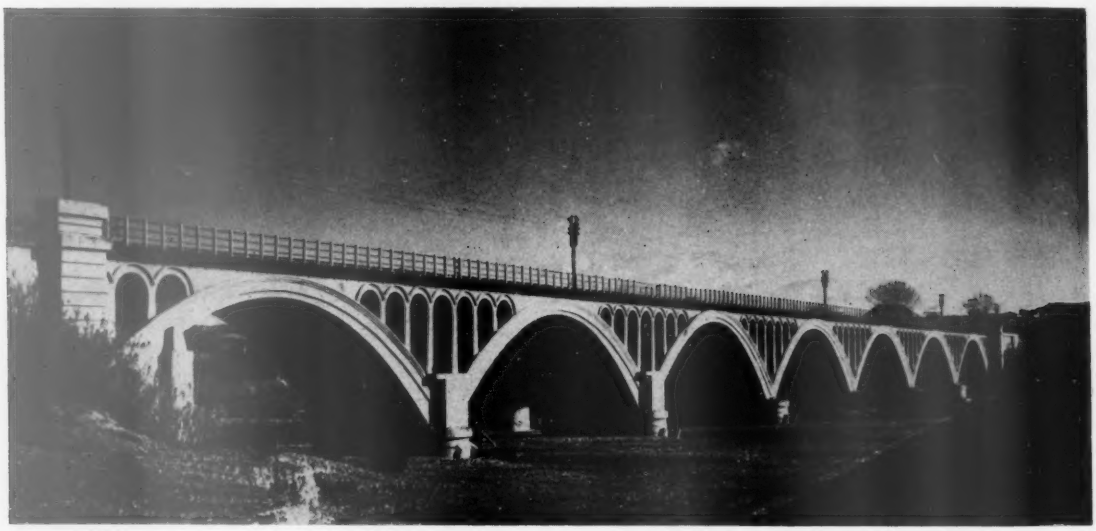
R.E.N.F.E. has made a systematic study of its steel bridges from the points of view of both resistance and maintenance status. As a result, five bridge classifications have been formulated. This number was not arbitrarily chosen, but corresponds closely to the different overloads governing the reckoning of steel structures in Spain. Class "A" includes those bridges unable to bear an axle-load over 14 tons and a load per ft. run of 1·63 tons. Class "B" applies to loads of up to 15 tons and 1·8 tons per ft. run. Class "C" covers loads up to 16·5 tons and 1·95 tons per ft. run. Class "D" prohibits loads over 18·5 tons and 2·15 tons per ft. run, and Class "E," those over 22 tons and 3 tons per ft. run.

The official life of Spanish bridges is 100 years and this legal life is calculated on accountable effects. An estimate for a new bridge therefore includes a deduction from its completed value of the amortisation over 100 years of the bridge which is being replaced. The final amount is chargeable to the Operating Expenses Account.

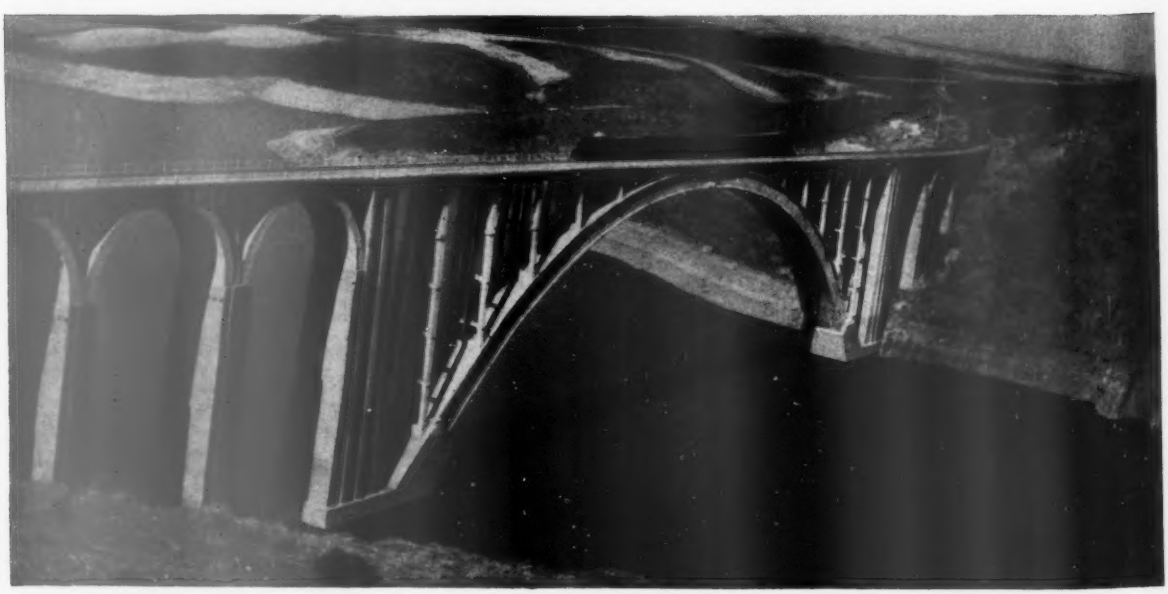
The estimated age of steel bridges replaced by R.E.N.F.E. varies between 40 and 80 years. The estimate is probably inaccurate because the weight of locomotives acquired by the railways tends to increase as time goes by and most Spanish bridges, therefore, are submitted to far greater loads than those for which they were originally designed. Such overstrain contributes to premature decay.

Some secondary lines possess steel bridges nearly 100 years old which,

The Huezna bridge on the Merida-Los Rosales line. Two parabolic arches of 42 metres and one of 50 metres span and four semicircular arches of 10 metres



Bridge over the Segre River on the Saragossa-Barcelona line through Lerida



The viaduct over the Esla River on the Zamora-Pueblo de Sanabria line

because they have not been required to bear heavy locomotives, are in a perfect state of resistance. A well-designed steel bridge which is also well maintained and which has not had to bear abnormal loads has an indefinite life.

Maintenance

Maintenance involves heavy expenditure, the curtailment of which inevitably must lead to strengthening or replacement of the structure. Re-painting is a fundamental requirement. An annual study is made of surfaces requiring attention and, on an average, bridges are re-painted every five years.

Painting usually is done by contract, and a coat of red-lead and two coats of anti-corrosive are used. Before application, these paints are tested in the railway laboratory.

Periodic examination is entrusted to the District Permanent Way Inspectors, who carry out bridge inspection during line survey. Annual reports to Bridge Service are made on the structure, piers, abutments, foundations, and drainage.

The four workshops of the Track Department employ 900 men, 320 of whom belong to the steel structures shops. In addition to bridge repairs, the workshops carry out the repair of turntables, roof structures, and awnings. Two of the workshops are fairly well equipped and have built some heavy new steel bridges.

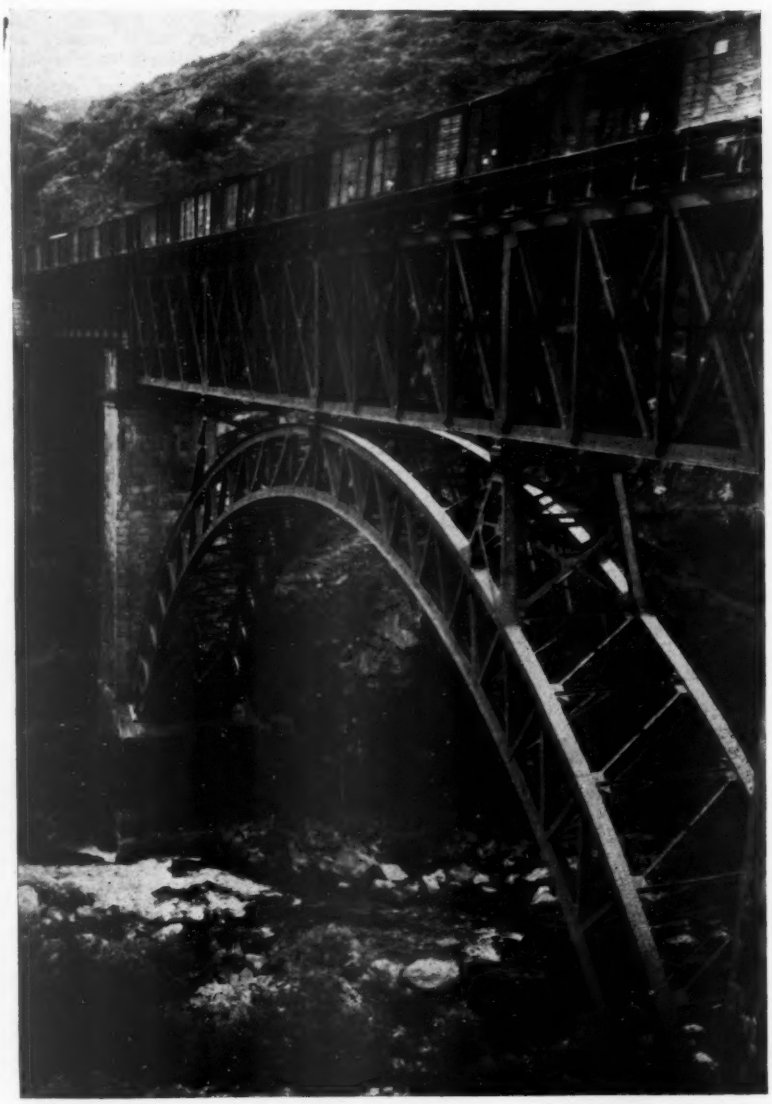
The workshops feed the mobile gangs generally consisting of five line workers. Compressors, electric-generating sets, and electric and oxy-acetylene welding equipment are used. In important jobs, track gangers and breakdown cranes help the mobile gangs. The workshops stock provisional bridges and steel and wooden towers for emergency work. These gangs work to plan and, beside urgent tasks, undertake perodical examination of all steel structures. The most common repairs are replacement of loose rivets, reinforcement of longitudinal girder joints and main girder struts, replacement of defective parts, repair of corroded areas, drainage of lower flanges of main girders, restoration of the rigidity of bracings, and correction of levelling with continuous spans.

Testing

Instruction demands that steel bridges be tested before use and after reinforcement or heavy repair. Tests are made with registering extensometers and strain gauges. Results are compared with original calculations. Recent tests have been carried out with electric extensometer gauges of resistance wire to compare the dynamic effects induced in steel bridges by steam and diesel locomotives. A decrease of strain of from 10 to 15 per cent with diesel locomotives has been observed, but insufficient tests have been made to form conclusions.

Formerly, all strengthening was done by riveting. This process is usually very expensive, because it requires much hand labour and must be carried out, for the greater part, at site. This must

Steel bridge over the Cabe River, showing strengthening of middle span



Close up view of the strengthened middle span of the Cabe River bridge on the Monforte-Orense line. The span is 65 *metres* (213 *ft.*)

be done without obstructing traffic. For the most part, the new material merely facilitates the overload and does not combine efficiently with the older elements. To overcome this difficulty, an opposite stress sometimes is applied to obtain a better distribution of load between old work and new.

In some cases, to reduce strain, intermediate piers have been introduced to halve the spans. In others, a steel bow has been constructed under the bridge to support the structure on three points and divide the span into four. In such a case, a negative deflection was given to the old span before settlement on the arch so that the latter could receive the reaction of the permanent load of the old bridge.

Lattice girders have been reinforced with concrete to increase tensile strength. To improve adherence, the metal was sandblasted. This process has been applied to spans of less than 82 ft.

On longer spans, the permanent load undergoes an increase so great that the addition of concrete is no longer economic. To strengthen steel piers, foundations permitting, a concrete coating has been applied as lightly as possible. This notably has increased resistance and rigidity. Small bridges are normally strengthened with provisional spans stocked in the railway workshops. In this way, all work at site is reduced to a minimum.

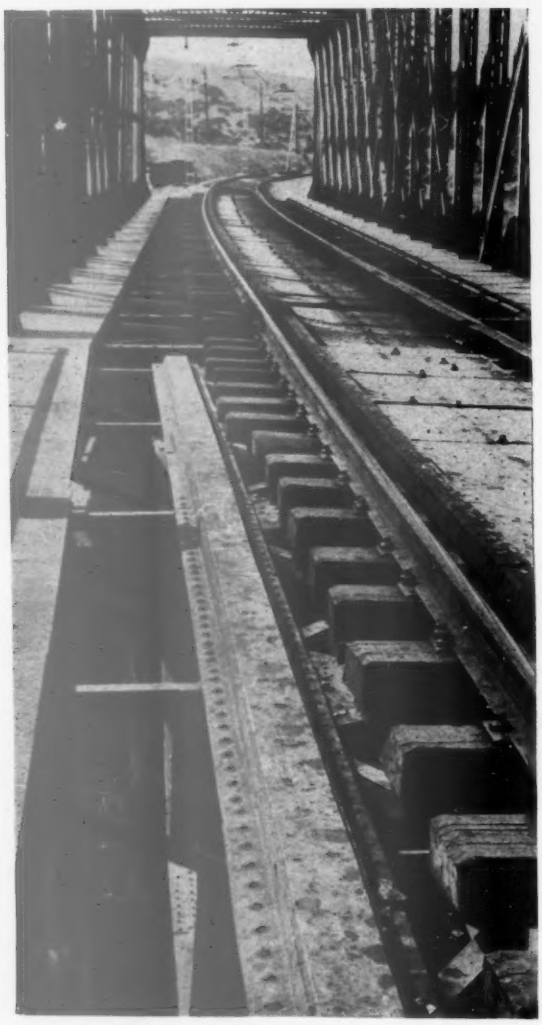
Electric Welding

Riveting difficulties have necessitated the use of electric welding. This method is advantageous in that rivets need not be cut and the bridge is consequently not weakened at any particular moment. Thus, trains can pass without the imposition of restrictions entailed by re-riveting. Good welders and careful vigilance during the work ensure the elimination of all the more serious defects attributed to welding. Any defects which may occur usually are easily corrected. Electric welding has been used successfully in the reinforcement of 35 bridges and will continue to be used.

It is more difficult to decide whether a bridge should be strengthened or completely replaced. As a rule, when the material to be used exceeds 20 per cent of the weight of a bridge, its replacement is decided. Replacement, though more expensive, is always preferable because a reinforced bridge retains most of its old, and therefore generally unreliable, materials. Maintenance expenses are consequently far greater for a replaced bridge than for a new one.

Wherever possible, mass concrete or reinforced concrete bridges are being substituted for old steel structures.

Culverts to drain off the water are being provided for viaducts which span ground depressions and in which the water flow is not important. Embankments are being filled out. Previously, old bridges were buried beneath these, but today all steel is salvaged to help ease the national scarcity.



Strengthening by welding of the top flange on the main girder of a bridge on the Madrid-Sevilla line

The diagonal stays and uprights of the same bridge which have also been strengthened by electric welding

Permanent Way Renewal on R.E.N.F.E.

A beginning made on the complete renewal necessitated by previous neglect and hard usage

By Alfredo Crespo
Vice-Manager, R.E.N.F.E., and Chief of Research & Reconstruction

THE internal upheavals experienced by Spain during recent years had a marked effect on the economy of her railways. One result was the considerable deterioration which set in on the permanent way.

Shortage of funds, always a factor with the private companies which operated the railways during the period of the Spanish Republic (1931-36), increased during the civil war (1936-39). During the 1939-45 war, the position was accentuated by lack of foreign currency. While the import of necessary track materials was impeded, vital industrial reconstruction made priority claims on the home steel output.

Until 1946, only a small quantity of rails—1,800 tons from the United States—could be imported. Until the end of 1957, rail imports amounted to only 31,000 tons from the United States and 19,000 tons from Belgium and France. To this total of 50,000 tons must be added a further tonnage of 42,000 imported in the main from Austria between 1955 and 1957, through American Aid. Thus, over a period of 11 years, it has been possible to import only about 92,000 tons of rails.

Home Supplies

During the same period, the Spanish steel industry supplied 140,000 tons. This was for the most part devoted to maintenance of the system, which covers a broad-gauge route-mileage of 13,314 km. (8,273 miles).

To make the best possible use of approximately 125,000 tons of this total which was allocated to renovations, about 1,300 km. (808 miles) were reconstructed on modern lines. It is now possible to travel comfortably at speeds of 75 to 80 m.p.h. wherever layout and profile of the line permit.

A special department has been set up to deal with track renewal and to carry out study and construction.

Before commencing renovation, the new department surveyed the routes concerned. New longitudinal sections were made, for the cost of re-laying would have been excessive, bearing in mind the changes effected over the years. Gradients were kept as flat as possible and, as profiles were flattened out, fixed levelling points were placed at intervals of about 200 metres (656 ft.) and outside the roadbed. These formed the basic points required for laying out the new profiles.

Transition Curves

During renewal, transition curves, previously not in use on Spanish lines, were introduced. The clothoid curve was chosen whenever track-slewing did not involve excessively costly work. In electrified sections where poles supporting the catenary limited the amount of transverse displacement, the transition curve used was the false sinusoid proposed by Klein. This has the great advantage of reducing the theoretical displacements of circular curves to approximately 40 per cent of those required by the clothoid: furthermore, the rate of change of acceleration is constant with the Klein curve. Full use of this property of the Klein curve cannot be made, because the greater transition lengths which are necessary result in greater displacement of the circular curve.

Working on the hypothesis that the centripetal uncompensated acceleration equals ·675 metres per sec. per sec. (2·22 ft. per sec. per sec.) and with maximum super-elevation 160 mm. (6·3 in.), admissible speed on curves of rad. R. is expressed by the formula V (km.p.h.) = $4{\cdot}5\sqrt{R}$. The inward displacement of circular curves up to 700 m. rad. (when use is made of the clothoid as transition curve) always equals 2·15 (7 ft. 1 in.). This shift often proves impossible to achieve, although it can be approached by effecting a suitable rotation in the plane of the straight track sections embracing the curve. It has been possible to introduce transition curves in accordance with the hypothesis mentioned above, even in difficult sections such as the descent from the Cantabrian range on the Madrid-Gijón line. This includes one 43-km. (26·7 miles) section with 58 curves and 53 tunnels having a total length of 24·672 km. (15·33 miles).

The outer edge of the railhead on the high side of curves has been referred both in plan and in elevation, to a number of stakes formed from scrapped rails. These are anchored in ballast as shown in Fig. 1. The stakes are 50 metres (164 ft.) apart in straight tracks and 10 metres (33 ft.) apart in curves. Pegs in curved tracks are also used when setting out curve realignments because greater accuracy is obtained when versed sines are taken with special apparatus mounted on the stakes than on the high rail.

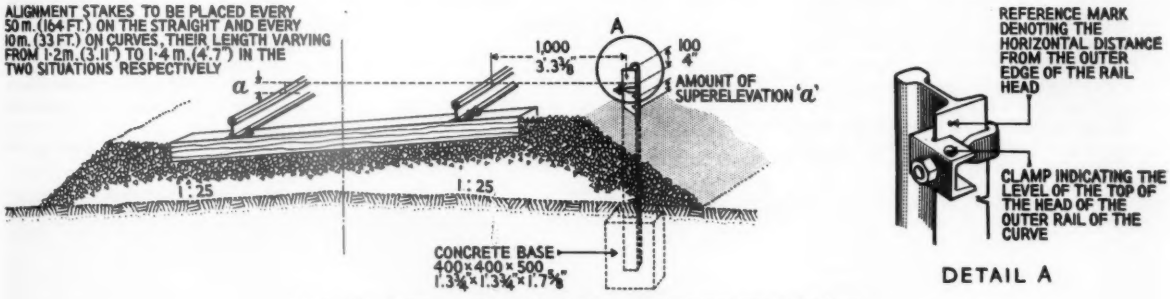


Fig. 1—Diagram of method of anchoring stakes in ballast

Transition curve table

Lengths of transition curves, selected on the basis of admissible speed and super-elevation, have been determined as shown below. The table has been compiled for sections with a maximum travelling speed of 75 m.p.h.

Radius R, metres	Speed S, km.p.h.	Super-elevation h, mm.	Transition-curve length L, metres
300	75	160	120
350	80	160	130
400	90	160	145
500	95	160	150
500	100	160	160
550	105	160	170
600	110	160	175
650	115	160	185
700	115	160	185
750	120	160	190
800	120	160	190
850	120	155	185
900	120	145	175
950	120	140	170
1,000	120	130	155
1,500	120	90	120
2,000	120	65	120
2,500	120	65	120
3,000	120	50	120

The 90-lb. rails rolled in 12- and 18-metre lengths were thermit-welded in 24- and 36-metre lengths in temporary workshops. Tunnel rails were welded into 240-metre lengths and conveyed by diplories equipped with special jacks and laid inside the tunnel where they were welded into continuous lengths, the longest measuring 3 km.

The suspended rail joint has been replaced by the supported type. Joint sleepers have been laid five cm. apart to permit mechanical packing.

Mechanisation of Quarries

To obtain maximum efficiency from the Matisa ballast-packing machines, R.E.N.F.E. has completely mechanised two quarries and is in process of mechanising two more. Together, the four quarries are capable of producing a daily output of 300 cu. metres (392 cu. yd.) of ballast with dimensions between 30 and 50 mm. (1¼ in. and 2 in.) and about 125 cu. metres (163 cu. yd.) of 15 to 30 mm. (⅜ in to 1¼ in.) of small broken stone for measured shovel packing. This method of levelling was used in all renovation work after two packings had been applied.

As track side-play was excessive—21 mm. (⅞ in.) for motive power and 13 mm. (½ in.) for rolling-stock—the back-to-back distance of wheels was standardised and normal track gauge reduced by six mm. It is now 1·668 metres (5 ft. 5¼ in.) with theoretical flange-way of 7 mm. (9/32 in.) for new flanges.

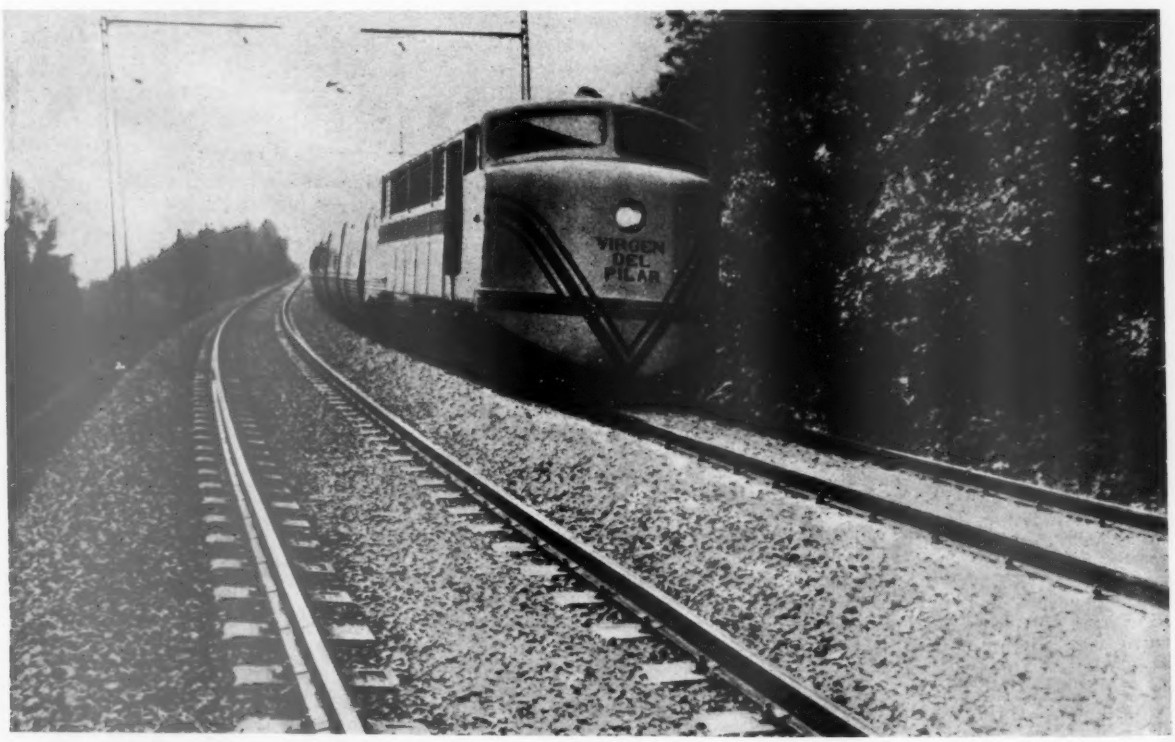
Gauge widening on curves has been lessened and now is only used on curves of 400 metres rad. or less, in accordance with the following table:—

Radii "R"	Track gauge
00 > R > 400	1·668 m.
400 ⩾ R > 350	1·673 m.
350 ⩾ R > 300	1·678 m.
300 ⩾ R > 250	1·683 m.
250 ⩾ R	1·688 m.

An example of the excellent drainage achieved after renovation of the roadbed

Until 1956, track-laying normally incorporated joints opposite each other. After that year, the 36-metre (118 ft.) rail was adopted with 12-metre (39 ft.) staggered joints was used with wooden sleepers. Over 250 km. (155 miles) have been so laid, with a resultant increase in smooth running. The conveyance of these 36-metre rails from welding shops to destinations presented no difficulty.

Over 50 per cent of the money spent



Rails 118 ft. long laid with 39 ft. staggered joints, using "RS" sleepers on two curves of 984 ft.

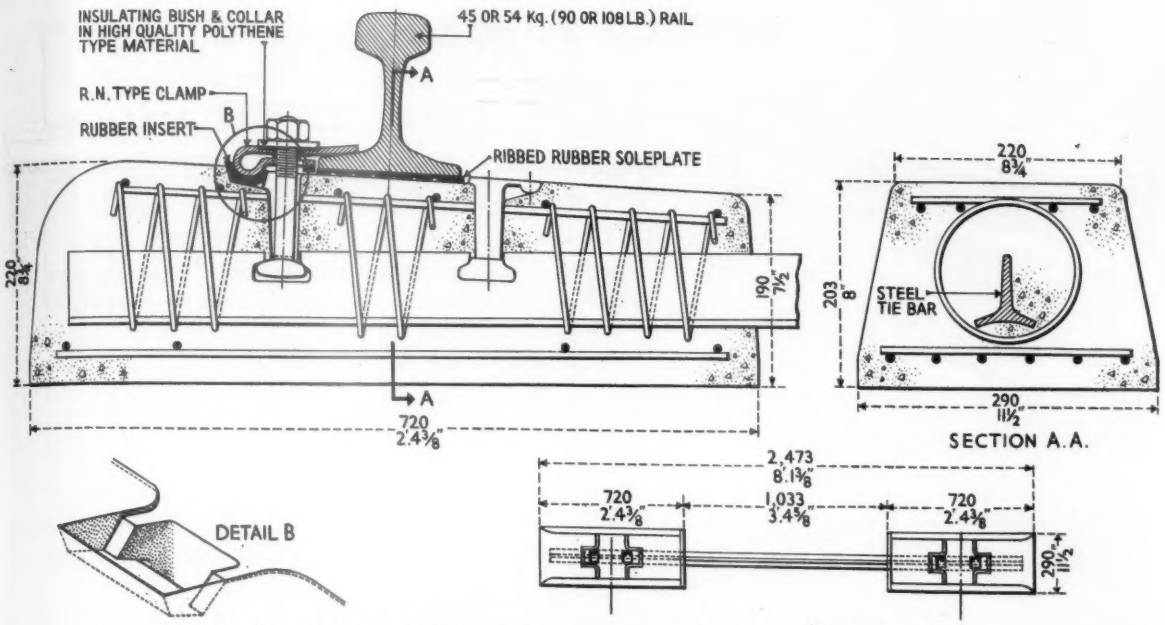


Fig. 2—S.N.C.F.-type elastic fixing for Roger Sonneville reinforced concrete sleepers

on renewal has been allocated to drainage of the roadbed. Obstructions to the escape of water have been lowered, cuttings widened, and earth or concrete ditches added where required. As an example of work done, an approach cutting was made to the tunnel of a local water divide on the Madrid-Irun line, involving the removal of 9,800 cu. metres (12·85 cu. yd.) of clay soil.

An average of 1,500 cu. metres of ballast is used on each kilometre renewed. Permanent way freshly ballasted to this extent needs a settlement period and a first, very vigorous mechanical packing is followed by a second, six or eight weeks later. Any subsequent irregularities are corrected by measured shovel packing, and the track is generally stabilised after two packings at intervals of a year.

Concrete Sleepers

R.E.N.F.E.'s first experiments with reinforced concrete sleepers were made in 1953, when 90-lb. rail was laid on Roger Sonneville sleepers provided with elastic fixation of the type used on the S.N.C.F. (Fig. 2). The test section was 1,200 metres (·76 miles) in length, of which 930 metres (3,052 ft.) were formed by continuous lengths fitted at each end with expansion joints (Fig. 3). On this length, temperatures from 7 deg. F. to 136 deg. F. have been registered, without giving rise to any trouble.

The excellent results achieved led to the further use of continuous lengths on concrete sleepers, and rails averaging 1,000 metres (3,280 ft.) in length, terminated with expansion joints, were adopted. The national network now possesses 114 km. (71 miles) of this type of track, using 90-lb. rails. Maintenance of level and alignment has been highly satisfactory, and upkeep costs consequently reduced.

Long welded bars are not used in sections formed by curves of radii less than 500 metres (1,640 ft.). This track is laid with rails of 36 or 48 metres (118 ft. and 157·5 ft.).

Little experience had been gained regarding the behaviour of "RS" sleepers on small-radius curves, and a test was made in July, 1957. The sleepers were installed with 36-metre (118 ft.) rails having 12-metre (39 ft.) staggered joints in two curves of 300-metre (984 ft.) rad.

To stop the narrow flange edge of the 90-lb. rail forcing itself into and twisting the branches of the elastic clips, these were reinforced with a flat supplement of the same material. Excellent results now have been attained, and several curves of 300-metre rad. have been succesfully laid on "RS" sleepers. Uniform distance between sleepers in 1-km. lengths is 60 cm. (2 ft.).

The recent adoption by R.E.N.F.E. of the U.I.C. rail of 54·4 kg. per metre, which practically equals that of

An example of the good results achieved by improved drainage

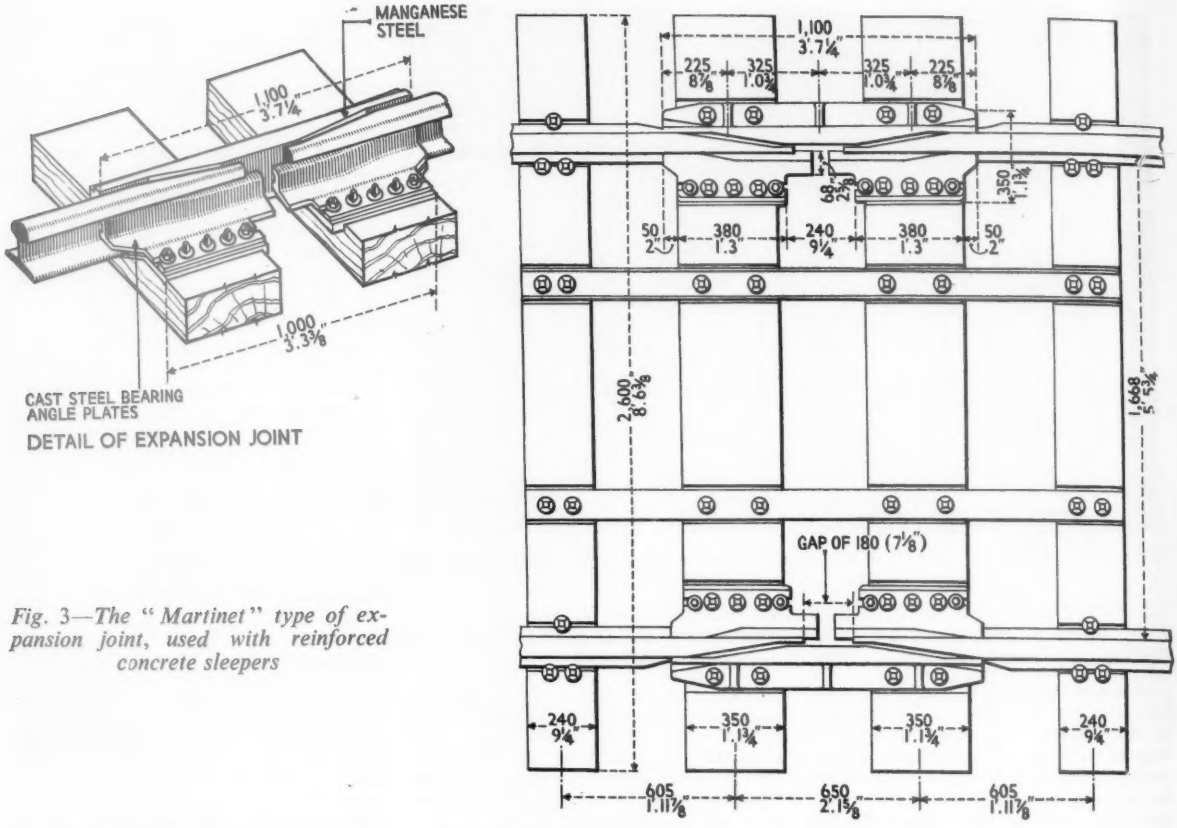
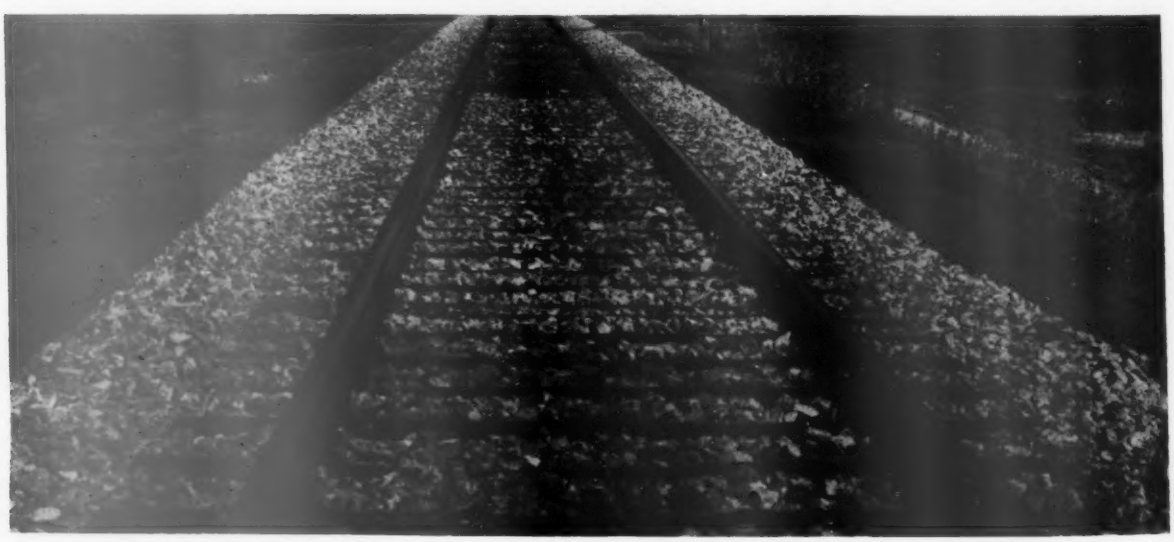


Fig. 3—The "Martinet" type of expansion joint, used with reinforced concrete sleepers

British Railways, means that renewals now are being effected over 200 km. (124 miles) of track with this type of rail on "RS" sleepers, using lengths of 1,000 metres (3,281 ft.) in length. Of this type of track, now standard throughout Spanish railways, 36 km. (22 miles) has been laid by hand at an average daily rate of 250 metres (820 ft.), with only three hours interval between consecutive trains.

The insulation of track circuits in sections fitted with "RS" concrete sleepers presented some difficulty. At first, insulation was carried out between clips and rail flanges, but this proved unsatisfactory. Excellent results finally were obtained by fitting the clip bolt with a flanged washer of ultra-violet-resistant superpolyamide (Fig. 2).

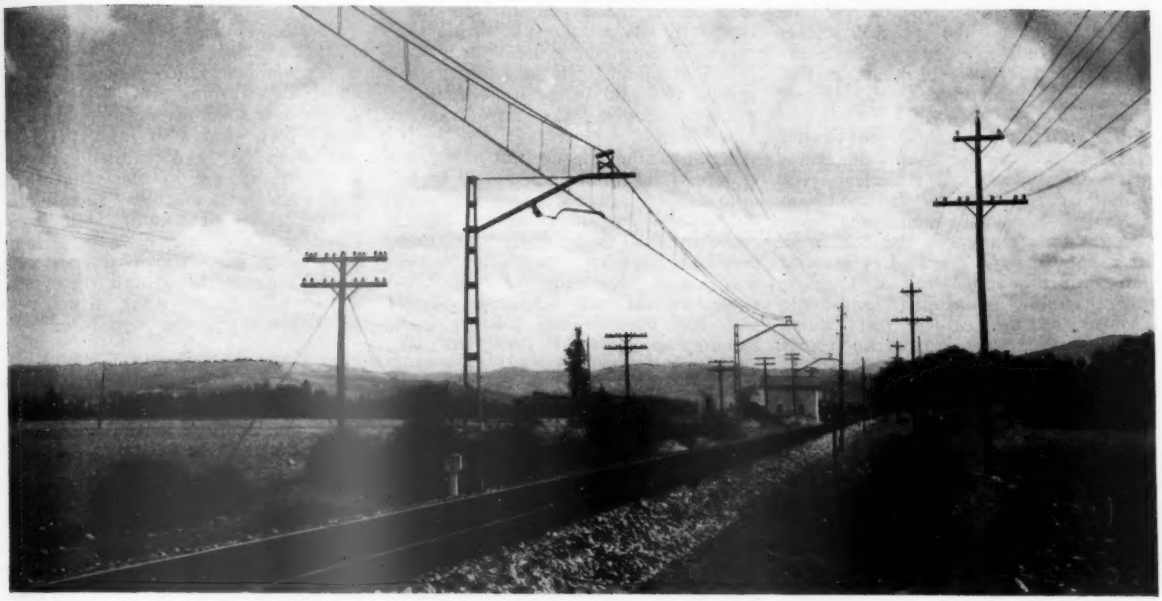
If mileage alone is considered, the volume of work completed in a decade may be judged as relatively small. Nevertheless, it should be borne in mind that all available material has been used, old-fashioned track abandoned, and a modern permanent way formed. From these points of view, the results obtained may be regarded as encouraging for they have served to set a standard for the large amount of work that still remains to be done.



Renewed track at Montoro

Signalling on R.E.N.F.E.

Revised code of signal aspects adopted and up-to-date equipment installed; some centralised traffic control



C.T.C. along a single track electrified section, R.E.N.F.E.

EACH of the privately-owned railways which in 1941 were combined to form the Spanish national system of R.E.N.F.E. had adopted different methods of signalling over the years, which themselves had become even more varied with the passage of time. The two principal companies—the Norte and the Madrid-Zaragoza-Alicante — each operating about 2,300 route-miles, also had adopted different rules of the road. The Norte operated left-hand running on its double lines while on the M.Z.A. the trains ran on the right. This divergence sometimes created difficulties in arranging junctions between the two railways, or in running trains from one company over a line belonging to the other.

Although in 1950 it was officially decided to adopt right-hand operation as standard for new—or doubled—lines and gradually to eliminate left-hand running, the two methods are still seen today in Spain. Left-hand running must necessarily persist for a long time yet on certain routes.

Early Safety Measures

In 1872 a decree laid down a few simple rules covering signalling and other safety measures and gave to the then popular three signalling colours of red, green and white the meanings of "danger," "caution" and "all right" respectively. The Norte and the M.Z.A. at first following French practice in the signalling of stations, using the round red "outer" disc as the principal—and very often the only—protection against approaching movements. Later, the square absolute stop disc as a home signal was introduced, when required.

As a rule, there were no starting signals. At selected locations the square disc was made to serve that purpose. In due course the M.Z.A. Company adopted the semaphore as a stop signal, at first chiefly at large stations. It was adopted by the Norte, in fishtail form, as a direction indicator at facing points, the practice long common in France. Some of the smaller companies also used semaphores to some extent.

Introduction of Interlocking

For many years the majority of stations had no interlocking equipment, and the points were worked locally under the supervision of the station-master. Interlocking frames, made by Saxby & Farmer in England, made their appearance at junctions at Barcelona and Lérida in 1882, but progress was slow and at first only a few stations or junctions were protected in this manner.

When the M.Z.A. Company completed its Atocha terminus in Madrid in 1893 it installed the hydraulic power system developed in Italy by Bianchi and Servettaz. This had been applied on a smaller scale in the previous year at Seville and two other places. In 1895 the Bouré key interlocking system was introduced from France. This afforded a cheap and reliable means of interlocking stations where the traffic did not exceed a certain volume. The double-wire system of point operation, using German designs or others very similar, also made its appearance and was installed at a number of stations by several of the companies.

In due course the Norte company developed its own design of double-wire equipment and manufactured it in its own workshops. With these arrangements all points were free when all signals were at danger and trailable mechanisms usually were provided.

Nevertheless, a considerable number of stations were still being operated with the minimum of signalling apparatus at the time R.E.N.F.E. was created. It was realised that the position must be regularised. Signal aspects and the rules applying to them must be standardised under the guidance of new principles, and a speedy remedy found for the lack of equipment, a serious obstacle to the provision of improved train services then so much in demand.

Use of Red Discs

An example of the practices requiring standardisation was the use of the red discs. These were favoured by several of the old companies but their rules governing the action to be taken by a driver on sighting one at "danger" differed in important essentials. It was recognised that it would be necessary to abolish the white signal light and to adopt the red, yellow, green system of indications. At the time of the last Congress held in Madrid, in 1930, the M.Z.A. Company announced its intention of effecting this reform.

A small all-electric route-lever power frame of the French Bleynie-Ducousso

type was installed in 1905 by the Norte Company at its Principe Pio terminus at Madrid. Seven years later, in 1912, the M.D.M. hydro-pneumatic route-setting apparatus, also of French design, was brought into service. In 1908 the Bleynie-Ducousso system was applied at Barcelona (Pueblo Nuevo) on the M.Z.A. line, and the individual lever Thomson-Houston electric system established for that line's terminus in that city. This incorporated the largest power signalbox in Spain.

The German A.E.G. all-electric was installed at the Venta de Baños marshalling yard, and American type individual lever power frames, with "dynamic" return indication, were brought into service in the Barcelona area. These were operated in association with the application in 1921 of track circuit controlled automatic signals. In the earliest installations these were 3-position electric semaphores. Later, colour-light signals of the two well-known forms, became standard.

Colour Lights

The Norte Company adopted colour-lights (but with yellow in place of white for "proceed") in 1924. These replaced mechanical signals on the Pajares Pass line between Ujo and Busdongo, electrified in that year to obtain better visibility. In 1927 the Norte installed automatic signalling between Madrid and Pozuelo, a distance of about 5½ miles. Modern a.c. equipment was used. This work was extended in 1930 to Villalba, a further 18 miles, and, eventually, in conjunction with the electrification between Madrid, Avila and Segovia, which was opened in 1944, to El Escorial.

Impedance Bonds

Impedance bonds had to be applied and certain other modifications affected; a special circuit was introduced to guard against a wrong side-failure arising from a breakdown of an insulated joint. Installations made earlier also had to be modified when electric traction was introduced in other areas.

By this time, the Central of Aragon Company had installed a certain amount of power operation and colour-light signalling on its Caminreal-Zaragoza line, where the intermediate stations had mechanical double-wire operation of the latest type. A national signalling industry now had been created. Relay interlocking appeared in 1944 and was adopted at Pozuelo, Santiago, Corunna, Zarzalejo and, later, at other places. All these pointed to the path future developments were to take.

New Code of Aspects

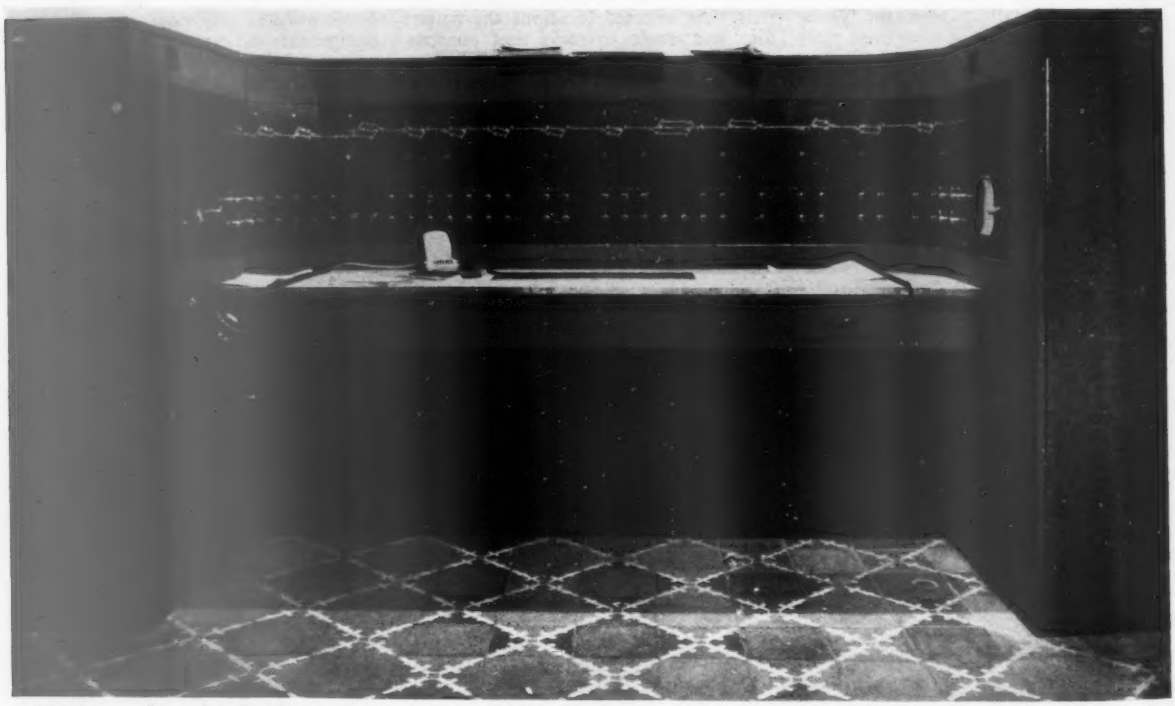
To elaborate a new code of aspects able not only to meet modern operating requirements but capable of introduction without dangerous confusion proved far from easy. Had it been possible to introduce colour-light signals throughout the system the difficulties would have been fewer. Unfortunately, this was impracticable for several reasons and adaptations of the existing mechanical type signals had to be made. These involved either the addition of spectacle mechanisms to the discs or—as has been done for a large number—the application of electric light units controlled by circuit closers.

A reformed code of aspects was approved by the Minister of Public Works on February 1, 1946. This introduced the yellow light for "caution" and green for "proceed," with combined yellow and green as an approach warning for, and double yellow as a reminder of, a speed reduction. New shapes of disc—triangular and diamond, and painted yellow—were introduced in this connection. The round red disc was retained for certain types of location, with combined red and yellow lights, and the rules relating to its observance were made uniform throughout the system. Violet and lunar white lights were adopted for shunting signals.

Work Involved

Over 6,000 signals were involved, of which over 4,000 were discs. Including point indicators and other subsidiary equipment nearly 12,000 items needed to be modified to suit the new code. The re-siting of large numbers of outer signals necessitated some 340,000 yd. of double and 635,000 yd. of new single wire transmissions.

Over 40 different designs of signal had been inherited from the old companies and new simplified standard types had to be evolved. This reform has now been completely effected and the revised aspects are in force at all R.E.N.F.E. stations. They are simple to understand and enable any layout



C.T.C. panel at the St. Bernardo Station at Seville controlling the line to Jerez de la Frontera, 65 miles, on the route to Cadiz

to be signalled efficiently at reasonable cost.

The Modernisation Plan

The signalling improvements envisaged in the modernisation plan initiated in 1949 covered the installation of colour-light signals, track circuiting within station limits, electric facing point detection, a certain amount of electrical point operation (with stationmasters' panels and appropriate controls), improved ordinary and key interlocking and other refinements at about 460 stations on some 2,000 miles of route. While the work was in progress, operation between stations was to remain controlled by telegraph or telephone messages in most cases, but a certain amount of interlocking block and automatic signalling was to be put in, covering about 170 route-miles.

Preliminary negotiations had been entered into and the work was divided among several foreign suppliers with the home industry participating to a certain extent. The main contractors had their own resident engineers and supervisors on site. These worked in co-operation with the staffs of the R.E.N.F.E. and local firms. Much of this work has been completed and the effect on train working has been very beneficial. Colour-light signals now are in use at over 400 stations situated on the lines where traffic is heaviest.

Improving Journey Times

Before these improvements were effected many journey times had been rendered unnecessarily long by the almost complete lack of adequate facing point locking and detecting. It was estimated, for example that, by fitting efficient apparatus, nearly 2 hr. could be cut on the Madrid-Corunna run of nearly 525 miles, which occupied about 20 hr. On other journeys similar or even better results could be obtained; the need to slow down at the approach to each single line crossing station no longer existed.

On routes where mechanical signalling was to remain oil lighting was to be replaced by electric working in some 2,700 outer signals on 2,500 route-miles. This would not only effect a saving in maintenance but make for greater safety, as the night indication of these important signals would then be much more arrestive. This work is being progressively extended and, in 1957, the 11 stations between Zamora and Pueblo de Sanabria were equipped with electrical signalling and interlocking block. This forms part of the route, now open as far as Orense, planned to connect Madrid with the Galician coast and to eliminate the present circuitous journey to Corunna. Similar equipment has been adapted to suit electric traction on the Santa Cruz-Mudela-Baeza line.

In addition to this electrical signalling, a considerable amount of mechanical equipment also recently has been installed where the cost of anything more elaborate was not justified. As a result, safety of working at intermediate stations has been much improved.

Centralised Traffic Control

The new programme included a small amount of centralised traffic control, hitherto not seen in Spain despite the suitability for conditions on certain routes. The location selected was the heavily-worked Ponferrada incline, a little over 30 miles long, which extends from Ponferrada to Branuelas and includes spiral curves and tunnels. The line is part of the main route connecting León with Monforte, a distance of some 150 miles and the link between the main part of the R.E.N.F.E. system and Galicia. It is one of the busiest in the country.

Type of colour-light signal used in the C.T.C. installation on the line between Seville and Jerez, some 65 miles

The great difficulties associated with steam operation led to the introduction of electric traction between Brañuelas and Torre in 1949 and thence to Ponferrada in 1953. Numerous civil engineering improvements also were carried out and the traffic situation became greatly eased. Nevertheless, it was realised that up-to-date signalling was essential if these changes were to bring about the maximum benefit. (Colour-light signals, controlled manually, had been introduced under steam in 1947.)

The C.T.C. equipment was brought into service on April 27, 1954. The supervisor's machine is located at Ponferrada and controls 38 pairs of points and 56 signals.

Six Intermediate Stations

There are six intermediate stations, each with two or three passing sidings, situated on the average 4·35 miles apart. The signals are of "searchlight" pattern, generally post mounted, and station starting signals are usually of ground type. Flashing warning lights on level crossings over principal roads operate in conjunction with loud bells and are controlled by track circuits.

The installation, which is constructed on well-proved principles in use for some time in the U.S.A., has functioned as intended and given every satisfaction. Had it been provided before electrification it probably would have enabled the traffic to be handled effectively by steam, but certain disadvantages, such as the very bad conditions frequently met with in the tunnels, would have remained.

Fewer Trains Needed

C.T.C. and electrification combined have enabled about 30 trains daily to do the work for which at least 36 usually were needed, with an average speed over this steep section of 12¼ m.p.h. as against 8¼ m.p.h. with steam, both running and standing times being greatly reduced. The tonnage of coal moved from Ponferrada, for long the most important station in Spain for such traffic, has been tripled and a further considerable increase is expected in the next few years. Other freight traffic is also expected to grow. (The completion of the Orense-Santiago line will enable certain long distance passenger services to avoid the Ponferrada incline.)

C.T.C. is to be applied to other sections, more especially the main Andalusian line between the capital and Cadiz, where it recently has been put into service between Seville and Jerez, a distance of about 65 miles. Its extension to Cadiz is to be completed before long.

Level Crossings

An extensive programme is in hand for improving protection at level crossings by the provision of lifting barriers, suitably controlled according to the nature of the traffic, both rail and road, and by local circumstances. This accords with the policy which has been adopted in recent years by all the principal European railway managements in an endeavour to reduce expenditure resulting from legislation enacted long ago and accompanied by no real return.

Conclusion

The elaboration of the new code of signal aspects and the implementation of the signalling modernisation plan has been the immediate responsibility of Don Julio Nogués Caíz, an Assistant Manager (Sub-director) of R.E.N.F.E. He has described the work in a number of articles in the technical press and was one of the reporters on signalling to the London Congress in 1954. It is of interest that the underground city lines in Madrid and Barcelona are equipped with excellent electrical signalling apparatus. This has been adapted to the special conditions of operation in the area.

Practical Results on R.E.N.F.E.

Permanent way and other works

ONE of the most difficult problems facing the newly-formed system of R.E.N.F.E., was that of bringing the permanent way up to modern standards. Even where no actual damage had been suffered, inadequate maintenance had resulted in a very poor condition of rails, sleepers, and ballast. In some places, these were dangerous.

Great progress now has been made. Complete renewal was effected of some 890 miles of track, and extensive repair work carried out on about 3,300 miles. The work has been conditioned by the available rail supply—about 138,700 *tonnes* and for the greater part of 90 lb. weight. This material was used on principal routes, superseded rails from which were used to rehabilitate stretches of lesser importance. This work has restored safe running conditions to the railways. Shortage of new materials is still a problem and some 6,800 miles of track still remains laid with rails over 25 years old.

Civil Engineering

Numerous bridges have been strengthened and others renewed; 68 have been replaced. Embankments have been strengthened, cuttings improved, and drainage works extended.

Part of the track has been re-aligned and the radii of curves increased. Large quantities of ballast have been required. R.E.N.F.E. owns some 40 quarries and partly owns nine others; supplies are also received from a considerable number in private ownership.

In 1951, about 26 million sleepers were in use, some 26 per cent of which no longer was fit for service. As the timber industry was unable to meet the railway demand for wood, the State established a large-scale afforestation plan. R.E.N.F.E. has its own creosoting plants for treating timber sleepers.

Large numbers of concrete sleepers also are now in service.

Tunnels are numerous in certain parts of Spain. Many have been re-lined or repaired; others have been widened. There are many tunnels, bridges, and viaducts, etc., on the new line connecting Zamora with Santiago via Orense, part of which is now open for traffic. This section will reduce the distance from Madrid to Santiago by 150 miles. The recently-opened 107-mile section between Orense and a point to the north of Puebla possesses 106 tunnels. These, which include the 3¾-mile Padornelo tunnel, total 29 per cent of the route. Grandota tunnel (3·756 km.) is situated on the recently-opened Tudela-Veguin-Lugo de Llanera line, which is 15 km. long.

The stations on the Madrid-Santiago line, including one built at Zamora to replace an older structure, are of imposing design, as are others recently contructed at Bilbao, Ponferrada, Barcelona (Sans), Oviedo, Santander, and Navacerrada.

The two termini in Madrid, Príncipe Pío and Atocha, also are to be rebuilt. At Pontevedra and San Sebastián, and at various stations and halts on the León-Gijón, Zamora-La Coruña, and Palencia-La Coruña lines, existing buildings have been greatly improved and extended. Improvements also have been carried out at Olaveaga and Bilbao-Puerto stations.

Track layouts and several marshalling yards have been similarly improved. Locomotive and other sheds, workshops, and stores have been modernised or newly-erected at several hundred places. Special repair shops were built to deal with the "Talgo" high-speed train. Reversing triangles were constructed at selected locations—these trains always travel in one direction.

One of the most important elements in the new plan was the establishment of a thoroughly modern system of communications.

A total of about 2,000 miles of pole lines and other forms of circuit have been renewed. The three-channel carrier system was adopted for the principal routes connecting Madrid with León, Bilbao, Barcelona, Valencia, and Seville. A single-channel carrier network unites the local managements with their own subsidiary centres. This system involves some 1,740 miles of conductors.

Approximately the same mileage also was covered by ordinary selective telephone working. Automatic exchanges were to be provided at some 20 locations. As an additional aid, radio communication was envisaged.

Much of this work has been carried to completion. Certain auxiliary equipment, such as loud speakers, has been installed in stations and yards. During the course of 1957, reconstruction works were carried out on the communications lines over a total length of 250 km. In addition, several selective telephone posts, centralised and decentralised, were installed. The resultant improvement in traffic working already has been very noticeable.

Electric Traction

The first section of 5-ft. 6-in. gauge route to be converted to electric traction was that between Nacimiento and Gador, near the southern end of the line from Madrid to Almería via Manzanares. The 6,000V. 3-phase a.c. sys-

tem was installed in 1911 and still is working. This section belonged originally to the then Spanish Southern Company, which owned some 190 miles of track.

In 1924, the Northern Company converted its Pajares pass line between Ujo and Busdongo, where gradients and tunnels made steam working exceptionally troublesome and adopted the 3,000V. d.c. system. For its remaining work between Alsásua and Irún, the French frontier, and from Madrid to Avila and Segovia, a voltage of 1,500 was chosen. Together with the 1924 section, these electrifications, carried out between 1929 and 1945, covered nearly 370 route-miles.

In 1946, the Ministry of Public Works issued a comprehensive report on future electrification, covering 2,800 route-miles. This subsequently received legislative sanction. The longest continuous lengths envisaged by this scheme were those from Madrid to Córdoba, Málaga and Algeciras; from Alicante through Valencia and Barcelona to Port Bou; and the lines north-west and north of León, with completion of routes to Medina del Campo from Madrid and from Burgos to Alsásua, etc.

Since 1948, when the Barcelona-Mataró line was electrified (also at 1,500V.) and extended to Arenys de Mar three years later, much new electrification has been carried out. Examples are the stretches between León and Ponferrada, Quintanilla and Santander, and Miranda and Bilbao. In Catalonia, electrification has been effected from Barcelona southwards to Tarragona, Réus and beyond, northwards via Granollers to Massanet-Massanas, and on other routes forming the so-called "Catalan Eight." The total electrically-operated route mileage of R.E.N.F.E. lines is now over 1,150.

Since 1954, all new work has been on the 3,000V. d.c. system, which has been adopted as standard. Certain sections previously working at 1,500V. have been changed to the higher voltage; others will be converted in due course. When all work is complete it is estimated that there will be an annual saving in coal of 1,200,000 tons (about one-tenth of the national output).

Cost Soon Recovered

On some sections benefits have been so marked that the cost of conversion has been recovered in the first twelve months of working.

During 1957, 132 km. of track was electrified and put into service. This figure includes the double-track section between Reus and Tarrogona, and the stretches between Mora la Nueva and Reus. S. Vicente de Calders and Matorell, the Prat and Casa Antunez-bifurcation to Barcelona-Casa Antunez Goods Station, and the line from Tudela-Veguin to Lugo de Llanera.

Traffic

Freight traffic carried by the old companies reached its maximum in 1930, after which year a decline set in which continued for some years. Figures had been steady in the years immediately preceding the creation of R.E.N.F.E. in 1941 but conditions subsequently improved and, during 1950-51, traffic increased over that carried in 1930 by about a third, some 7,800 million ton-km. During 1952-55, traffic decreased slightly. The following year, an improvement once more set in, despite a poor harvest.

The total freight carried at that time was about 50 per cent above that of prewar. Although this traffic was being handled by the same number of wagons as had been used pre-war, many were new and of high capacity. All were much better operated than before. In 1957, ton-km. carried was 9·958 millions.

An increasing number of through trains carrying particular classes of freight, have been introduced. In collaboration with the Transfesa and Semat organisations, international services have been instituted with the aid of vehicles equipped with interchangeable bogies. In this way, break-of-gauge has been avoided at French frontier stations. Door-to-door services have been improved.

The year 1930 also was a record one for passenger traffic. Nevertheless, this, like the goods traffic, also began to fall. After 1942, a great improvement took place, and traffic carried rose by about 100 per cent compared with the period immediately preceding the disturbances. As this upward trend continued, train frequency was improved. For a 13 per cent passenger increase over 30 per cent more trains were available, with corresponding increase in weight hauled. The TAF diesel trains and railcars have been extremely popular with the travelling public and have considerably improved journey times. Overall timings on many runs have been markedly reduced. These higher average speeds are especially valuable because the heavy gradients and sharp curves prevalent in Spain prevent steam traction

Railway bridges on the line between Barcelona and Tarragona

from being used to best advantage. The extension of electrification and dieselisation will further accelerate average speeds in the near future.

It is of interest to note that improved signalling also has contributed to this welcome result. Formerly the most adverse effect on average speeds occurred as a result of a necessary deceleration at facing points. These were not locked and controlled as in most other parts of Europe.

More of this new equipment, which has remedied this defect over a considerable mileage, will be installed.

Fast trains now can run through the single-line crossing stations at speed under full interlocking protection and very often under colour-light signal indications.

Rates and Fares

Although authority has been received on seven occasions to increase charges, the pressure of economic conditions has rendered such a course unrealistic. This factor is one of the causes of the deficit now burdening the undertaking. Comparison of the increased costs with those of 1935 compared with the increases in the R.E.N.F.E. charges, shows an adverse and steadily-widening gap.

This lag behind ruling conditions has had a very serious effect; railway facilities are being offered at rates much cheaper than those of any other Spanish service or commodity and, relatively, much cheaper than those demanded anywhere else in Europe.

During 1957, various studies were presented to the Ministry of Public Works. These were directed toward the attainment of formulae leading to a tariff appropriate to present economic reality.

Locomotives and Rolling Stock

Although some old locomotives still are in use on the system, these have been augmented by many modern units, machines of great power and high adhesion being necessitated by the heavy gradients ruling on numerous sections of route.

When the rehabilitation plan was adopted in 1949, 2,660 steam locomotives were in service. This number does not include those used exclusively for shunting.

Insufficient maintenance had reduced the efficiency of these locomotives, and a programme of construction was put in hand, both overseas and Spanish manufacturers being concerned.

A number of machines was taken out of service as economically no longer useful. In 1953, this number was 2,195; nevertheless, haulage power available was actually 48 per cent greater than obtained in 1944.

Extension of electrification has enabled the steam locomotive stock to be concentrated on a reduced route-mileage, thus effecting a further increase in overall efficiency. Modern improvements incorporated in the new stock include (in certain classes of engine) mechanical stokers. The use of these has resulted in fuel economies.

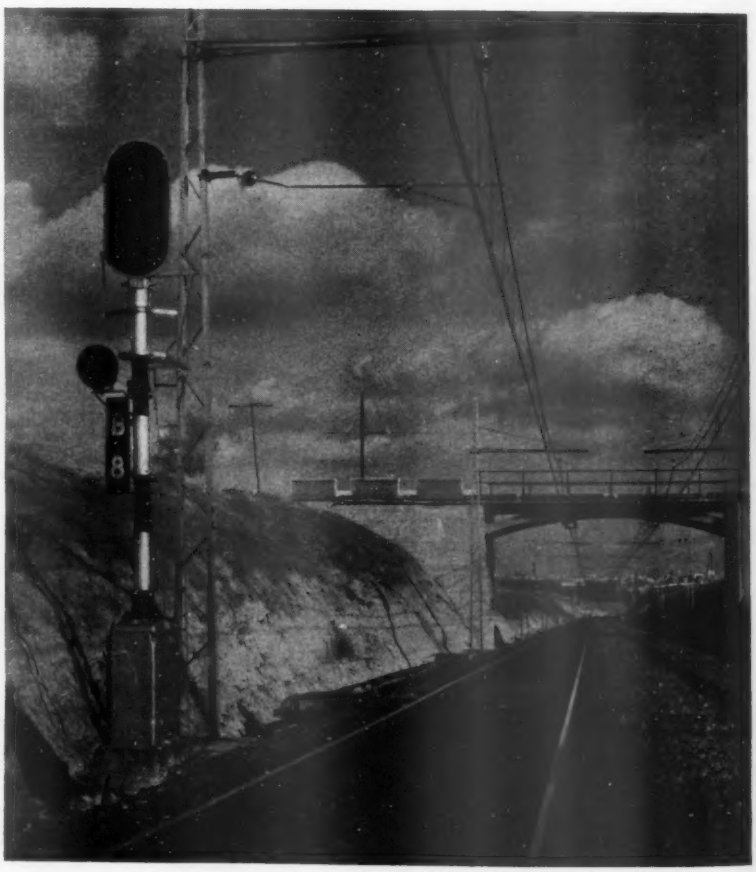
The elimination of old designs has effected a large annual saving in working expenses. In some areas where water is of poor quality the steel fireboxes used on some locomotives eventually gave trouble. The water-softening plant which was installed to meet this trouble has given excellent results; repairs have been reduced, fewer locomotives are now required to perform the same service, and many thousands of tons of steel have been made available for use in industry which otherwise would have been required for railway purposes.

Of a total of 534 steam engines ordered, 440 have been delivered. The complete order was for 40 diesel shunters, one "ferrobus" train, 10 Renault railcars, 20 complete diesel train sets, and 10 railcars of Fiat type. These deliveries cover all passenger services run with these classes of equipment.

The diesel vehicles have given excellent service and there have been few breakdowns. This class of train (Talgo) runs from Madrid to Irún, via Avila and Miranda; from Madrid to Granada, Màlaga, Cádiz, and Huelva in the south-west; to Zaragoza and Irún via Castejón; from Zaragoza to Tarregona and Barcelona and down the eastern coast to Valencia and Alicante and Cartagena; from Madrid, via Venta de Baños and Salamanca to León and to the north-west ports to Vigo, Corunna, and Gijon, and Santander.

Principal single railcar services run between Madrid and Badajoz and from Madrid to Logroño. In 1955, some large diesel-electric locomotives were introduced. These, equipped for multiple-unit operation when required, were applied first on the Santa Cruz de Mudela-Baeza incline. Here they proved able to run over 6,000 miles monthly and deal with loads of 750 tons. The limit for steam locomotives on this section is 450 tons. The first delivery covered 15 locomotives. This class of traction is being extended.

In 1944, a beginning was made on the replacement of timber-bodied main-line bogie passenger stock by all-steel vehicles, of which over 400 have been put in service since 1949. A certain number of older coaches have been converted to this pattern and today all long-distance trains are formed from vehicles of this type. A recent improvement has been the introduction of excellently appointed cafeteria cars, manufactured in Spain, to run in the Madrid-Málaga, Madrid-Corunna and Bilbao-Barcelona services. These have been most favourably received by the travelling public.



Concrete sleepers laid in electrified track

Much of the freight wagon stock is old; more than 20,000 vehicles date back over 50 years and many must be scrapped in the near future. Over 1,140 wagons have been delivered by overseas manufacturers and over 6,800 by Spanish industry; delivery of a further 2,000 is awaited. These additions to R.E.N.F.E. wagon stock will have to be further augmented.

Renovation of wheels and axles, the provision of automatic vacuum brake (standard in Spain), and the strengthening of couplings and drawgear is proceeding as rapidly as practicable in present conditions. About 10,000 freight vehicles already are vacuum-fitted and about 30,000 are piped to work in conjunction.

These measures are particularly necessary on a system where steep gradients are numerous—by their agency safety is increased, journey times shortened, and less operators required on the trains. On the very difficult lines in Almeria, for example, it was formerly necessary to have a brakesman on practically every wagon.

Although financial outlay has been considerable, the savings arising from this policy have been more than justified. About 17,000 sets of couplings and drawgear have been strengthened and failures in service reduced to under one-hundredth part of the figure obtaining before work commenced.

These far-reaching improvements in all classes of passenger and freight service have been accompanied by a fuel economy programme. To reduce coal consumption and obtain better service from the steam locomotives, some 200 of the most powerful have been fitted to burn oil, about half the proposed programme. These will be used in the areas most remote from the Asturian coalfields but easily accessible from the Escombreras refineries, chiefly on long-distance passenger and through high-speed freight services.

Three-cylinder 2-10-2 *heavy goods locomotive*

Staff & Welfare

In the same year in which R.E.N.F.E. was established some improvement in rates of pay was effected by decree. On January 1, 1945, however, there came into force official regulations covering the matter in detail and making noteworthy improvements in all salaries and wages. Since then, supplementary modifications have been authorised. These have greatly improved conditions of all grades, not merely in the matter of ordinary payments, but in those of bonuses, sickness allowances, pension rights, etc.

In the first 15 years, the burden so created has increased more than fourfold; dividing total outgoings by numbers employed gave in 1942 a figure of 6,000 pesetas and in 1956 one of 25,000.

The number of employees taken over from the old companies was about 110,000; in 1954, a maximum of some

Confederation-type, 4-8-4 *heavy express locomotive, which uses fuel oil*

R.E.N.F.E. class "7600" electric locomotive

132,800 was reached. Personnel at the end of 1957 numbered 129,700. It had proved necessary to create new departments and take other steps rendering a larger staff indispensable, at least for the time being.

More recently, serious endeavours have been made to obtain more efficient operation. With the aid of rationalisation and mechanisation, it has proved possible to reduce the total to about 126,500: the aim is to lower it to about 121,700, while maintaining and possibly increasing standards.

The Economic Position

In both 1941 and 1942 R.E.N.F.E. showed a working surplus—this amounted to 94 million pesetas in the latter year. Since then, although the system has been continuously in deficit, the amounts involved have varied considerably in different years. In 1947 the loss was 48 million pesetas, in 1949 it was 724 million; with the exception of 1951 it remained thereafter below 400 million annually until 1954 when it rose to 882 million. In 1955 it was 1,027 million, the next year the figure was 1,413 million and in 1957, 1,908 million.

The deficit was kept down at intervals by increased rates but over a continuous period the position remained unsatisfactory.

When the actual increase in traffic is considered, together with benefits achieved under the progressive application of the rehabilitation plan, those factors operating to produce a negative result are seen to be of exceptional consequence. The unsatisfactory level of rates and fares is without any doubt the most serious of these.

The Spanish railway situation has certain similarities to those of other countries, where government intervention has taken place to the extent that it now has come to be regarded as a general characteristic of railway economics.

The position largely is traceable to that created when railways enjoyed a virtual monopoly, as a result of which they incurred certain obligations. Although not under public ownership, Spanish railways came to acquire the character of a public service over the years. This aspect of the country's communication system has become accentuated by the fact of nationalisation.

Other means of transport are provided by Spain's roads, rivers, and canals. These have come to be regarded as the national property to an even greater extent.

This situation obviously is improved

Spanish National Railways 1,750-b.h.p. Alco-General Electric Co-Co locomotive, 5-ft. 6-in. gauge

by the formation of an organisation operated on commercial principles, an object difficult to achieve without the formulation of a sound principle of charging. Without this, some form of subsidy is unavoidable.

Charges can be raised only within certain limits, beyond which traffic becomes discouraged. The essentials of the situation were emphasised by the General Manager of R.E.N.F.E., Señor don José M. García-Lomas, in an address given in 1954 at Bilbao. Señor García-Lomas stated that if it was desired to keep to commercial principle in a nationalised railway undertaking the whole question of its operation needed to be considered without prejudice. If this were not done there was a grave risk of coming under the domination of false conceptions and their harmful consequences. The older principles on which rates were based had lost their value since the railway became subject to competition from road and air. New bases have had to be found and, in the general interest, some way of obtaining the best public service from each form of transport.

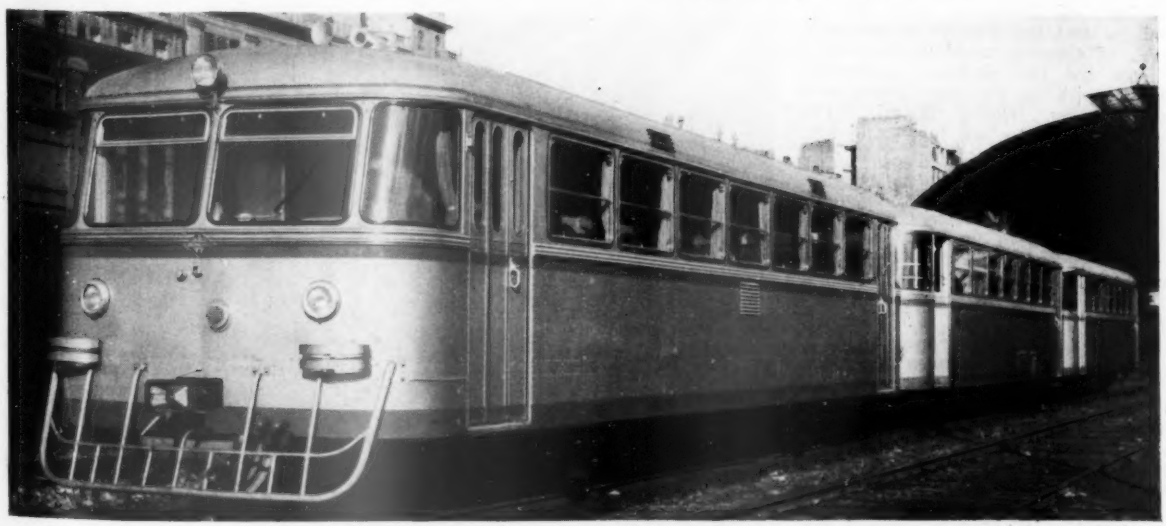
Economic Aid

From time to time, under agreements made between the Spanish and American Governments, money has been allocated for improvements to R.E.N.F.E. These, for the most part, relate to the purchase of permanent way material, diesel locomotives, wagons—with spare parts of various kinds—raw material for use in the manufacture of rails, and much new signalling equipment.

A large proportion of this form of aid has been devoted to the improvement of working on the Madrid-Cadiz line, where diesel locomotives have given excellent service. Three American engineers have come to Spain to give technical assistance, and on four occasions Spanish engineers have visited the U.S.A. to study latest railway developments.

One of the popular "Talgo" trains

One of the "Taf" railbuses



"Ferrobus" light railcar running in the environs of Valencia

Spanish Suburban Trains

High-tension d.c. triple sets of good power : weight ratio

Schindler four-motor 1,200 *h.p. broad-gauge* 3,000-*V. d.c. motor-coach*

DURING the past few months a total of 20 three-car 3,000-V. d.c. electric trains has been delivered for operation in the northern parts of Spain. The contract was placed with a Swiss-Spanish consortium registered in Madrid as Gestesa (Grupo Español-Suizo de Trenes Eléctricos S.A.), which made arrangements with R.E.N.F.E. for the supply over a number of years of 128 triple-car and twin-car formations, the first 20 of which were to come from Switzerland complete, and most of the constituents of the remaining 108 sets from Spanish licensees of Swiss companies.

For the 20 trains now delivered, and each comprising two motor coaches with an intermediate trailer, Schindler Wagons S.A., of Prattela, built all the motor coaches and assembled the complete formations; the Swiss Car & Elevator Manufacturing Corporation Limited, of Schlieren, built all the trailers; and the Ateliers de Sécheron S.A., of Geneva, acted as main contractor for the electrical equipment, though with certain main constituents supplied by Brown Boveri. The Spanish associates are La Maquinista, Material y Construcciones S.A., and Industrias Aguirena.

These 5-ft. 6-in. gauge trains have some notable characteristics principally in regard to the traction motor output and the high h.p. per ton of weight. There are 248 seats in second (28) and third (220) classes. Empty weight of a motor coach is 57·9 *tonnes*, and of a trailer 30·9 *tonnes*, giving a train weight of 146·7 *tonnes* (144 tons). Every axle of each motor coach is driven by a traction motor of 300 h.p. continuous rating, or a total of 2,400 h.p. for the train, equal to 16.5 h.p. per ton of empty weight, or 19·3 h.p. per ton against the one-hour rating of 350 h.p. per motor. With a full-train h.p. per ton is about 14 against the continuous rating, giving an ample acceleration rate, even up to the maximum designed speed of 68 m.p.h. The motors are wholly springborne, and drive through the Sécheron blade elastic coupling.

All coaches in the train are of the same overall dimensions, *viz.*, 82 ft. body length, 9 ft. 2 in. body width, and 12 ft. height to roof; and in all coaches the bogie pivot pitch is 59 ft. 8 in., though in the motor coach the bogie wheelbase is 9 ft. 2 in. as against 8 ft. 10 in. for the trailer bogies. Wheel dia. of all the vehicles is 29⅝ in. The coaches are of all-welded steel construction on the lightweight principles practised widely by Swiss builders and in which roof, sides and floor all take a part in load carrying; the outer side panels are copper bearing steel plates 2·5 mm. thick. At the coach ends Scharfenberg multi-purpose automatic couplings are fitted and permit of multiple-unit operation. All coaches have Young adjustable windows, and down each side of every coach are two sliding doors under electro-pneumatic remote control.

Bogies

The bogies, also, are of the well-known Swiss type with swing bolster supported on side laminated springs, and with the SKF roller-bearing axle-box castings extended to form a cradle carrying two helical springs per box, and with an hydraulic shock absorber incorporated within the springs.

Knorr air brakes are embodied, and apply two blocks on every wheel, from one cylinder per bogie on the motor coaches and from one cylinder per car on the trailers. Air sanding is applied in each direction.

Electric control equipment includes automatic starting, with the alternative of full manual control, through electro-pneumatic contactors. Rheostatic braking is embodied to give steady braking down gradients of 1 in 50, and even steeper inclines for certain formations made up of two motor coaches now being built principally for the Léon area.

A 2,400-*h.p. three-car set near Barcelona*

RAILWAY NEWS SECTION

PERSONAL

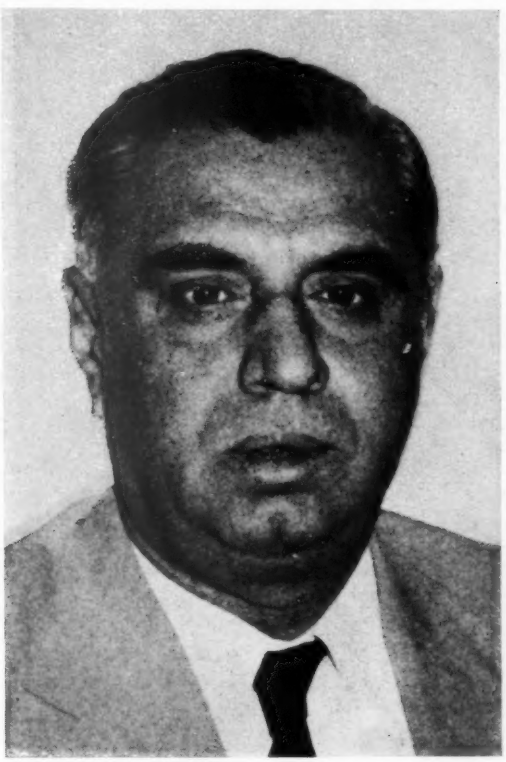
Mr. Edwin Black, Chief Engineer, Way & Works, Ceylon Government Railway, has retired. He has been succeeded by Mr. N. A. Vaitialingam, Deputy Chief Engineer.

Dr. F. T. Barwell, Wh.Sch., Ph.D., B.Sc.(Eng.), D.I.C., M.I.Mech.E., A.M.I.E.E., M.I.Loco.E., M.I.E.S., Senior Principal Scientific Officer of the Department of Scientific & Industrial Research, who, as recorded in our August 8 issue, has been appointed Electric Traction Engineer (Research), Electrical Engineering Department, British Railways Central Staff, commenced his training as a premium apprentice in the Chief Mechanical Engineer's Department of the Great Western Railway at Swindon in 1927. After experience in the test house and drawing office at Swindon, he studied Railway Motive Power Engineering at the City & Guilds College (Imperial College), South Kensington, during the tenure of a Whitworth Scholarship. Following study of electric railway work with the London Passenger Transport Board at Acton Works and Golders Green, he was awarded a Robert Blair Fellowship. This enabled him to spend a year studying electric and diesel railway traction in Europe and North America. In 1939 he joined the Scientific Staff of the National Physical Laboratory, where he worked on subjects including plastics, lubrication, and the creep of metals. In 1948 he was appointed Head of the Lubrication & Wear Division of the then newly-formed Mechanical Engineering Research Organisation, where he was responsible for a series of researches, including a study of adhesion between wheels and rail. Dr. Barwell is the author of some 50 scientific and technical papers and of a book entitled "Lubrication and Bearings." He is a Member of Council of the Institution of Engineers & Shipbuilders in Scotland and Honorary Treasurer of the Whitworth Society.

Mr. H. P. Barker, who is a Part-Time Member of the British Transport Commission, has been appointed a non-resident Director and President of British & Irish Railways Incorporated, New York, in succession to Mr. F. A. Pope, who recently retired. This organisation represents, in the United States and Canada, the transport and hotels interests of the British Transport Commission and the Irish Railways. Mr. Barker became a Part-Time Member of the Commission in January, 1951, and is Chairman of Parkinson Cowan Limited. He was educated at Oundle School and served his apprenticeship in Mechanical Engineering with Waygood-Otis Limited. He was Consulting Engineer with A. H. Barker & Partners from 1935 to 1939 and Deputy Director, Instrument Production, Ministry of Aircraft Production, from 1940 to 1944.

Mr. D. D. Sethna, who, as recorded in our July 4 issue, has been appointed Chief Commercial Superintendent, Western Railway of India, was born in 1905. After taking his Bachelor of Arts Degree, with Honours in History and Economics, from Bombay University, Mr. Sethna joined the Madras & Southern Mahratta Railway as a traffic candidate in 1929. He became Acting Assistant Transportation Superintendent (Traffic) in 1931 and worked on various districts, and also served as Assistant Commercial Officer (Claims) at Headquarters. In 1946, he was appointed District Transportation Superintendent (Traffic), in charge of various districts. In 1951, on the re-grouping of railways and the introduction of the Regional System of working, Mr. Sethna became Senior Officer (Movement), Mysore Region, Southern Railway of India. In 1952, he was promoted to be Junior Administrative Grade, and transferred to the Western Railway as Deputy Chief Commercial Superintendent (General) at Bombay. In October, 1952, he was appointed Regional Traffic Superintendent, Gondal Region, Western Railway. In April, 1956, he took over as Regional Traffic Superintendent, Bombay. On the introduction of the Divisional System on the Western Railway, in August, 1956, he became the first Divisional Superintendent, Bombay.

Dr. F. T. Barwell
Appointed Electric Traction Engineer (Research), British Railways Central Staff



Mr. D. D. Sethna
Appointed Chief Commercial Superintendent, Western Railway, India

Mr. J. H. H. Gillespie has been appointed Assistant Chief Engineer of the Tyne Improvement Commission.

Mr. T. W. Brodie, whose impending retirement from the Western Australian Government Railways was recorded in our July issue, and whose term of office as Acting Commissioner has expired, joined the railway in 1910, as a junior clerk. Mr. Brodie worked through successive grades in the Traffic Branch, serving as Clerk, Stationmaster, Transport Clerk, and in other similar positions. During the 1939-45 war he was attached to the Army Movement Control Group in Western Australia, rising to the rank of Major, subsequently holding the appointment of Deputy Assistant Director of Transportation. Mr. Brodie returned to the railway as Chief Transport Clerk, and, on the formation of the Railway Road Service Section in 1947, he was selected from numerous applicants from both inside and outside the railway service for appointment to the position of Superintendent of Road Services, a sub-head under the Chief Traffic Manager. He continued in this position through the initial development stages until, in 1951, he became Assistant Chief Traffic Manager. He became Chief Traffic Manager in 1953, and has held the appointment as Acting Commissioner for six months. Mr. Brodie could not be reappointed Acting Commissioner after having served one six-month term of office. Had he been appointed Commissioner, he would have held office for only four months before retirement.

Mr. T. W. Brodie

Acting Commissioner, Western Australian Government Railways, who is retiring

Mr. T. Marsland

Appointed Commissioner, Western Australian Government Railways

London Midland Region, British Railways announces the following appointments:—

Mr. C. M. Sykes to be Traffic Costing Officer, Divisional Traffic Manager's Office, Liverpool.

Mr. P. D. M. Ings to be Traffic Costing Officer, Divisional Traffic Manager's Office, Nottingham.

Mr. W. H. Holmes to be Traffic Costing Officer, Divisional Traffic Manager's Office, Manchester.

Mr. W. E. Thomson to be Traffic Costing Officer, Divisional Traffic Manager's Office, Finsbury Square, London, E.C.2.

Mr. J. C. V. Thompson to be Assistant (Permanent Way Maintenance) to Chief Civil Engineer, Chief Civil Engineer's Office, Euston.

Mr. P. Weir to be Assistant District Traffic Superintendent (Operating), Barrow.

Mr. W. H. Thompson to be Assistant District Commercial Manager, Derby.

Mr. R. A. E. Lamming to be New Works Assistant (Design), Chief Civil Engineer's Office, Euston.

Mr. T. S. Wyatt to be Assistant District Operating Superintendent, Birmingham (W).

Mr. A. E. Hodgson to be Assistant to District Operating Superintendent, Birmingham (W).

Mr. J. H. Waddell to be Assistant District Passenger Manager (Sales), Manchester.

Mr. H. A. Stannard to be Assistant to Accountant (Book-keeper), Euston.

Mr. T. G. Dentith to be Assistant District Motive Power Superintendent, Wellingborough.

Mr. H. W. Mear to be Assistant Works Manager, Locomotive Works, Derby.

Mr. J. Coulthard to be Assistant to District Goods Manager, Bolton.

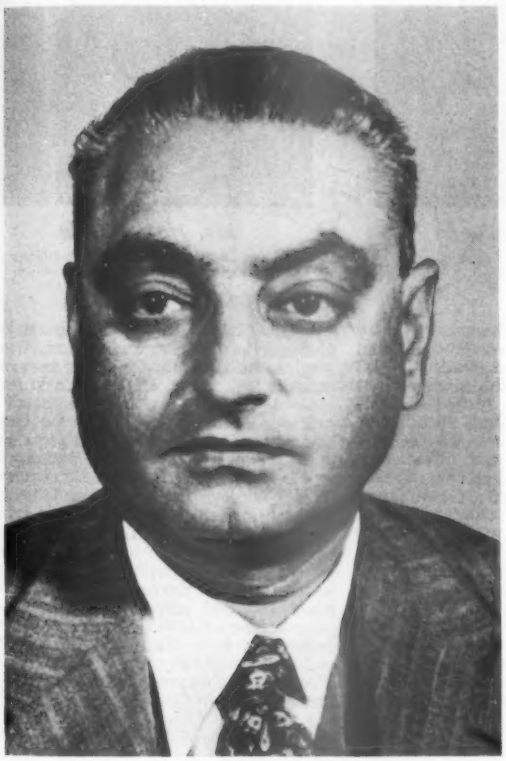
Mr. J. S. Leslie to be Station Master, Carlisle.

Mr. R. N. Payton to be Assistant District Operating Superintendent, Crewe.

Mr. T. Marsland, Chief Mechanical Engineer, Western Australian Government Railways, who, as recorded in our July 18 issue, has been appointed Commissioner, was educated at Ardwick Higher Grade School, Manchester, gaining an exhibition at the Manchester College of Technology. He was apprenticed to Beyer, Peacock & Co. Ltd. (Manchester) in 1909, and later became a junior draughtsman. During the 1914-18 war he served with the Royal Field Artillery. On demobilisation, he rejoined Beyer, Peacock & Company. He later was appointed Electrical Locomotive Designer with the Metropolitan-Vickers Electrical Company, but subsequently returned to Beyer, Peacock & Company. In 1928 he took up an appointment with the Mechanical Branch, West Australian Government Railways, as a locomotive draughtsman. Mr. Marsland was promoted to be Assistant Workshops Manager at the Midland Junction Workshops in 1937, and later Assistant Chief Mechanical Engineer and Chief Draughtsman. He became Chief Mechanical Engineer in 1950. He is a Member of the Institution of Locomotive Engineers and the Institute of Engineers (Australia).

We regret to record the death, on September 10, of Mr. Frederick Osgood Hickling, Technical Manager of Ransome & Marles Bearing Co. Ltd. for the past 30 years.

Mr. Q. F. Rahman, Government Inspector of Pakistan Railways, who, as recorded in our August 1 issue, has retired, completed his education at Bristol and London Universities and graduated B.Sc. Mr. Rahman joined the former East Indian Railway as Assistant Executive Engineer on probation in 1925, and was confirmed in that appointment in 1927. In 1930, he passed the first Junior Officers' course at the Railway Staff College, Dehra Dun. In 1938, he was appointed Acting Executive Engineer, Senior Scale, and subsequently served as Divisional Personnel Officer; Air Raid Precaution Officer, and A.R.P. Executive Officer. In 1944 Mr. Rahman joined the Railway Board as Deputy Director, Civil Engineering, and, the following year, was appointed Personal Assistant to the Chief Government Inspector of Railways and Leave Reserve Officer. He subsequently became Acting Government Inspector of Railways and was confirmed in this appointment in 1947, on being transferred to Pakistan. He served for about a year as Deputy Director General of the Civil Aviation Department and, in 1949, was re-appointed Government Inspector of Pakistan Railways. Mr. Rahman has left Pakistan to take up an appointment with the Civil Engineering Department, Malayan Railway.



Mr. Q. F. Rahman

Government Inspector of Railways, Pakistan 1947-48 and 1949-58

Mr. A. R. Azar

Appointed Government Inspector of Railways, Pakistan.

We regret to record the death, on September 12, at the age of 83, of Mr. Harry Skeet Broom, Chairman & Managing Director of Broom & Wade Limited.

Mr. Hermann J. Abs and Lord Rothschild have been elected to the board of the Magnum Fund, formerly the Mexico Tramways Co. Ltd.

Mr. J. T. W. Dewar, Joint Managing Director of Firth-Vickers Stainless Steels Limited, has been appointed Managing Director, on the retirement of Mr. C. E. Holmstrom, Joint Managing Director. Mr. Holmstrom has been appointed a non-executive director.

Mr. P. Liddell has been appointed General Manager of the Dunlop Rubber Co. (Indonesia) Ltd.

Mr. W. G. Goff, Personnel Officer, Fort Dunlop, the Dunlop Rubber Co. Ltd., has retired.

We regret to record the death of Mr. Samuel Thomson, a director of Colvilles Limited and a former President of the Iron & Steel Trades Employers' Federation.

Mr. Bernard A. Christie has been appointed home sales Manager for all products of Coventry Climax Engines, following the reorganisation of the sales department. Mr. Christie is a Director of Coventry Climax (Electrics) Limited, a subsidiary of Coventry Climax Engines.

Mr. J. D. Slater has been appointed to the board of A.C.V. Sales Limited and will combine the duties of Director & Commercial Manager. Mr. L. C. Parsons has been appointed Secretary of Park Royal Vehicles Limited and Mr. J. Ford becomes Secretary of A.C.V. Sales Limited.

Mr. A. R. Azar who, as recorded in our August 1 issue, has been appointed Government Inspector of Pakistan Railways, joined the North Western Railway of India in 1931. Mr. Azar was appointed Divisional Executive Engineer in 1944 and Divisional Personnel Officer in 1945. In August, 1947, he became Deputy Chief Engineer, and the following year was appointed Deputy General Manager. During his career he has held appointments as Divisional Superintendent, Quetta, Multan and Rawalpindi; and as Chief Controller of Stores.

Mr. A. P. M. Purdon has been appointed Operations Study Manager in charge of Central Operational Research & Work Study for the British Oxygen Co. Ltd.

Mr. William B. Broadbent, Engineer, Railway Department, Mobiloil Co. Ltd., is joining the Railway Division of Birfield Industries Limited, on October 1.

Mr. George Campbell has been appointed General Manager, Chemical & Metallurgical Division, the Plessey Co. Ltd.

Mr. G. W. Morrison

Stationmaster, St. Pancras, L.M. Region, 1955-58

Mr. J. Handley

Appointed Stationmaster, St. Pancras, L.M. Region

Mr. H. D. Poole

Rates Assistant to Commercial Officer, Paddington, Western Region, 1949-58

Mr. G. W. Morrison, Stationmaster, St. Pancras, London Midland Region, British Railways, who, as recorded in our August 22 issue, has retired, began his career as a junior clerk with the Lancashire & Yorkshire Railway at Rishworth in 1913. After serving with the Royal Engineers in France, during the 1914-18 war, he gained experience at stations in the Leeds and Halifax areas and, in 1928, was appointed Stationmaster & Goods Agent at Ripponden. He was later Stationmaster at Ince and Stationmaster & Goods Agent at Boars Head and Red Rock. Mr. Morrison next held Inspector's positions at Wigan and Crewe, becoming Assistant Stationmaster at Preston in 1944. He moved to Manchester Victoria in a similar capacity in 1947, and, two years later, was appointed to be a Head Office Inspector for the Central Division. In 1951, he was appointed Stationmaster at Blackburn and the following year became Stationmaster at Derby. Mr. Morrison became Stationmaster at St. Pancras in 1955.

Institute of Transport

The Berks, Bucks, and Oxon Section of the Institute of Transport announces the following appointments for the 1958-59 session :—

Chairman
Mr. A. E. Smith.

Vice-Chairmen
Mr. W. J. Mayo and Mr. C. O. T. Purcell.

Hon. Treasurer
Mr. W. J. Evans.

Committee
Messrs. A. V. Coles, E. Havers, D. A. Lamb, T. P. Sheridan, W. B. Street, N. S. Taylor, C. Moore, R. H. Kitson, and E. Hens.

Co-opted Members
Mr. A. H. Spring, Chairman, Graduate & Student Society; Mr. B. T. Lister, Hon. Secretary, Graduate and Student Society.

Hon. Auditors
Mr. P. H. Fisher and Mr. J. A. Dear.

Hon. Secretary
Mr. W. F. Cooper.

Assistant Hon. Secretary
Mr. W. J. Mason.

Mr. J. Handley, Stationmaster Derby (Midland), London Midland Region, British Railways, who, as recorded in our August 22 issue, has been appointed Stationmaster St. Pancras, started his railway career as a junior clerk at Emneth, Norfolk, in 1916, and became Stationmaster there in 1935. After three years as a clerk at Stratford, London, he became Assistant Yardmaster, Goodmayes, and in 1940, Stationmaster, Canning Town. In this position Mr. Handley also had charge of Thames Wharf. He was appointed Assistant Stationmaster, Liverpool Street, in 1943, and a year later, Stationmaster at Bridlington, Yorkshire. He served in a similar capacity at Scarborough, Sunderland and Monkwearmouth, and, in 1950, became Assistant Yardmaster at Hull West. Mr. Handley successively became Stationmaster at Bathgate and at Kirkaldy, Scotland, at Manchester Central in 1953, and at Derby in 1955. During the war Mr. Handley served as a Lieutenant in the 17th L.N.E.R. Battalion, Home Guard (attached to the Royal Fusiliers). His platoon, at Canning Town, was awarded the King's Certificate for good work during air raids.

Mr. William H. McFadzean has been elected Deputy President of the Federation of British Industries. Mr. McFadzean is Chairman & Managing Director of British Insulated Callender's Cables Limited and other companies in the B.I.C.C. group. He is also a member of the council of the Institute of Directors.

Mrs. Alison Munro, former Assistant Secretary, Ministry of Transport & Civil Aviation, who has been in charge of the Railways & Inland Waterways Division, has been appointed Under-Secretary of the Air Services & Civil Aviation International Relations Group of Divisions.

Following the death of Mr. E. B. Beck, the Board of John Mowlem & Co. Ltd. has made the following appointments:—Sir George M. Burt, Chairman, Mr. E. C. Beck, Managing Director, Mr. H. A. Henry, Mr. J. Westacott, and Mr. W. G. Gove, Directors.

Mr. H. D. Poole, Rates Assistant to the Commercial Officer, Paddington, Western Region, British Railways, who, as recorded in our September 12 issue, has retired, entered the service of the Brecon & Merthyr Railway in 1908 in the General Manager's Office. After amalgamation of that system with the Great Western Railway in 1922, Mr. Poole was attached to the Cardiff Valleys District Goods Manager's Office. In January, 1923, he was transferred to the Assistant Goods Manager's Office at Paddington and, in 1930, after serving in various sections, he became Head of the Section responsible for Railway Rates Tribunal, private siding intakes and other special subjects. Mr. Poole was made Supervisor, Rate Making Sections in 1935, and in that capacity represented the Great Western Railway on Several Railway Clearing House Committees. In 1940 he was appointed Chief General Clerk, Rates Department, Chief Goods Manager's Office, and in 1943 became Assistant. He also became a member of the Irish and English Traffic Conference. In 1949, Mr. Poole was appointed Rates Assistant to the Commercial Superintendent, Western Region. During this time he served on the committee responsible for working out requirements for the New Charges Scheme under the Transport Acts of 1947 and 1953.

Mr. R. F. Harvey, Export Manager, of the Telegraph Construction & Maintenance Co. Ltd., has been appointed General Sales Manager (Cables). Mr. E. H. Gosling continues as Home Sales Manager, and Mr. J. L. Woollett, London Branch Manager, is appointed Export Sales Manager (Cables). The North London area will be managed by Mr. H. T. Walker, the Central London area by Mr. A. A. W. Barnes and the South London area by Mr. B. Keefe, who will all be directly responsible to the Home Sales Manager.

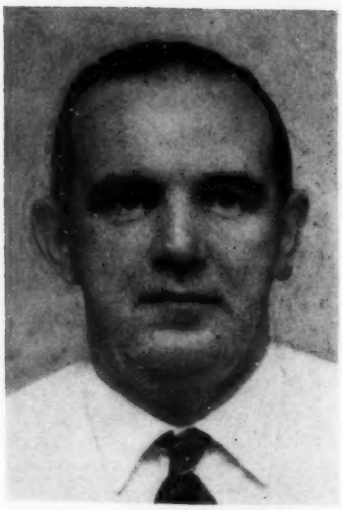
Mr. E. Player, Deputy Chairman & Managing Director, Birmid Industries Limited and a director of Midland Motor Cylinder Co. Ltd., and Mr. F. A. W. Livermore, Works Director of the latter company, have been appointed Joint Managing Directors of the Midland Motor Co. Ltd.

Mr. E. C. Taylor

Pay-Rolls Officer, London Transport Executive, 1946-58

Mr. N. G. Robins

Appointed Pay Rolls Officer, London Transport Executive



Mr. S. L. Smith

Seconded as Traffic Manager, Jamaican Government Railways

Mr. E. C. Taylor, A.C.I.S., Pay-Rolls Officer, London Transport Executive, who, as recorded in our September 12 issue, has retired, is 65 years of age. Mr. Taylor joined the London General Omnibus Co. Ltd., as a clerk in 1912, and has served for 46 years in the Financial and Secretarial Departments of the London Transport Executive and its predecessors. He was appointed Deputy to the Pay-Rolls Officer in 1940 and became Pay-Rolls Officer in 1946. At the time of his retirement he was in charge of what is believed to be Britain's largest mechanised payroll installation. Mr. Taylor was a founder member of the Administrative Staff Sports Association. He served as Secretary of the Association for seven years and has been Chairman since 1948. He was President of the London Transport Philatelic Society. From 1921 to 1946 he was Secretary of the Administrative and Supervisory Staff Superannuation Fund.

Brigadier R. J. O. Dowse, Metropolitan Traffic Commissioner & Licensing Authority, is resigning on December 31; he will be succeeded by Mr. D. I. R. Muir.

Mr. N. G. Robins, Cost Assistant in charge of the Catering Costs Office, London Transport Executive, who, as recorded in our September 12 issue, has been appointed Pay-Roll Officer, is 44 years of age. Mr. Robins joined the Accountant's Office, Swindon, Great Western Railway, in 1930. From then until 1947, with a break for war service, he was engaged on accounting, costing and pay-roll work at Swindon, and from 1947 to 1953 he was Welfare Accountant in the Regional Staff Office, Paddington, Western Region. Mr. Robins joined London Transport in 1953 as the Costs Assistant in charge of the Welfare (now Catering) Costs Office.

Mr. S. L. Smith, Assistant to District Operating Superintendent, Glasgow South, British Railways, Scottish Region, who, as recorded in our September 5 issue, has been seconded to the Jamaican Government Railways as Traffic Manager, with headquarters at Kingston, commenced his railway career as junior clerk in 1926 at Cambuslang on the former Caledonian Railway. After service at Scotstoun West and Carmyle, Mr. Smith became Assistant Controller at St. Rollox, then at Carlisle and Motherwell. Later he served successively as Controller at Stranraer, Grangemouth, Glasgow Headquarters, Edinburgh Waverley, and Glasgow Queen Street. After a period from 1952-54 as Yardmaster, Motherwell, he was transferred to the office of the Chief Operating Superintendent, Glasgow, and from there he took up the appointment which he now relinquishes.

Institution of Locomotive Engineers Awards

The Institution of Locomotive Engineers announces the following awards:

The Frederick Harvey Trevithick Award

Mr. J. Koffman (Member) for his paper "Vibrational aspects of bogie design."

The Institution of Locomotive Engineers Award

Messrs. H. A. Gill and J. M. Smith (Non-Members) for their joint paper "Fuels and injection equipment for traction diesel engines."

The Alfred Rosling Bennett Award

Messrs. M. G. Burrows (Member) and A. L. Wallace (Associate Member) for their joint paper "Experience with the steel fireboxes of the Southern Region, British Railways, Pacific locomotives."

The Charles S. Lake Award

Mr. H. G. McClean (Member) for his paper "American experience as a guide to main-line diesel locomotive applications overseas."

The Stewart-Dyer Awards

(1) Messrs. J. S. Scott (Member) and J. K. Lord (Member) for their paper "Maintenance and overhaul of electric locomotives and multiple-unit sets on the Manchester-Sheffield-Wath Electrification."

(2) Mr. K. Swarup (Member) for his paper "Design and manufacture of lightweight coaches." Paper presented in Bombay.

A Special Award to Messrs. J. Dearden (Member) and J. E. Roberts (Non-Member) for their joint paper "Steel for railway purposes."

The Graduates' Award to Mr. W. F. Glasspoole (Graduate) for his paper "Some thoughts on gas turbine locomotives."

London Transport Executive announces that, arising from the retirement of Mr. J. Schofield, Works Manager (Trolleybuses), Mr. J. W. Wicks, Works Manager (Buses & Coaches), will, in addition to his present responsibilities, assume overall responsibility for the trolleybus works.

Mr. A. R. Purves, Engineering Superintendent (Road Services), will, in addition to his present duties, be responsible to Mr. Wicks for the day-to-day operation of the trolleybus works.

This arrangement became effective on September 8, 1958, together with the following changes in titles of Officers and Principal Executive Assistants:—

Mr. J. W. Wicks, Works Manager (Buses & Coaches), to be Works Manager (Road Services).

Mr. A. R. Purves, Engineering Superintendent (Road Services), to be Engineering Superintendent (Road Services) & Works Superintendent (Trolleybuses).

Mr. T. C. Ball, Plant Engineer (Buses & Coaches), to be Plant Engineer (Road Services).

Mr. W. D. D. Brewer, Progress & Materials Superintendent (Buses & Coaches), to be Progress & Materials Superintendent (Road Services).

Mr. H. Faulkner, Works Superintendent (Buses & Coaches—Chiswick), to be Works Superintendent (Road Services—Chiswick).

Mr. A. F. Tame, Works Superintendent (Buses & Coaches), Aldenham, to be Works Superintendent (Road Services—Aldenham).

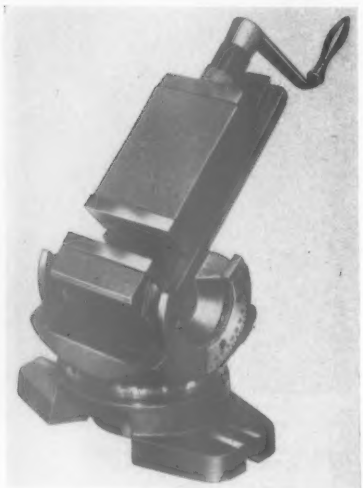
Mr. L. C. Lloyd, Assistant Works Superintendent (Aldenham), to be Assistant Works Superintendent (Road Services—Aldenham).

Mr. A. G. Higgins, Chief Development Assistant (Buses & Coaches), to be Chief Development Assistant (Road Services).

Mr. J. Morgan, Chief Rate Fixer (Buses & Coaches), to be Chief Rate Fixer (Road Services).

Mr. J. S. Stevens, Senior Planning & Rate-Fixing Engineer (Buses & Coaches), to be Senior Planning & Ratefixing Engineer (Road Services).

NEW EQUIPMENT AND PROCESSES



Tilting and Swivelling Machine Vice

A ROBUST tilting and swivelling machine vice which is arranged to give positive control locking without the use of spanners has been designed. Known as the J & S Model 1712, it has a lock to withstand heavy loads.

The centrally disposed Acme thread locking shaft has "auxiliary" and "master" circular locking nuts which allow quick positioning. The nuts are operated by means of a tommy bar supplied. The "auxiliary" nut locks the swivelling base, leaving the tilting member free. The "master" nut provides a solid lock to both swivelling and tilting movements.

The tool is made of Meehanite castings throughout with hardened and ground steel jaw plates. The central locking shaft is of high tensile steel with Meehanite locknuts. The vice screw is also of good quality tensile steel, working in a phosphor bronze nut and completely enclosed.

Principal dimensions are as follow:—Width of jaws, 4 in.; depth of jaws, 1½ in.; capacity, 3 in.; height, flat position, 7⅛ in.; length, overall, 12 in.; width, overall, 10 in.; width of base, 7¼ in. The vertical swivel movement is 90 deg. with a 360 deg. horizontal swivel movement. It has a net weight of 5·2 lb. approx.

Further details may be obtained from the manufacturer, A. A. Jones & Shipman Limited, Narborough Road South, Leicester.

Multi-Skip Dumper

A DUMPER has been designed for bulk handling production materials. It is stated that a new method has been incorporated; interchangeable free-standing skips combine with the multi-skip dumper, making a versatile combination.

Basically it comprises a diesel-powered mobile unit with a hydraulically-operated jib and wire rope which handles any number of loose skips. The machine can control precisely the lift tilt and discharge of the skips so that even liquids can be poured safely, and can also recover the skip from 12 ft. or 6 ft. below ground level according to model.

The interchangeable skips can handle liquids or solids without splash and can be sited round a plant for filling whilst the dumper is employed on other duties. One machine can thus handle materials as varied as swarf and rubbish; coke and coal; sand; chemicals and liquid overspill.

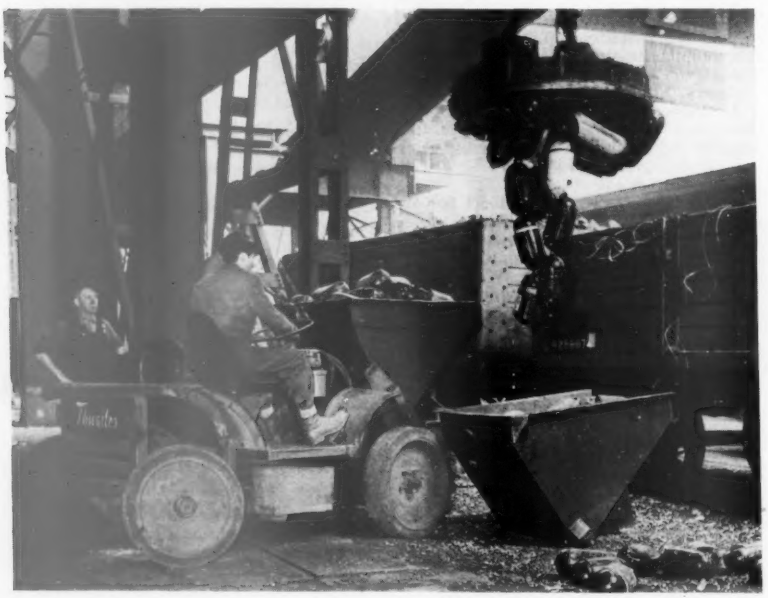
The small turning radius, under 9 ft., and narrow width permit easy manœuvrability close to machinery. It is robust in construction and has large road wheels with which to cross rough or broken ground.

For construction work the dumper can be used handling concrete. On sites where local conditions prevent mixer being sited within lifting radius of crane or hoist, the multi-skip dumper and three concrete pouring skips enable a continuous flow of concrete to be maintained from a mixer to forme. Bottom or side discharge skips are available.

The engine is a Petter AVA2, fitted with special deep sump. Tyres are 7·50 × 20 track grip India on driving wheels and 6·00 × 16 plain rib on steering wheels. The chassis is of rolled steel channel, 6 in. × 3 in. and 3 in. × 2 in. sections.

Maximum payload is 1 ton, with crane skip, 15 cwt. with standard 10 cub. ft. skip. Dimensions without skip attached are: length, 8 ft. 6 in.; breadth, 5 ft. 7 in., and height, 6 ft. 4 in. The weight is 1 ton 9 cwt.

Further details may be obtained from the manufacturer, Thwaites Engineering Co. Ltd., Welsh Pond Works, Cubbington, Nr. Leamington Spa, Warks.



Bearing Wedges

A RANGE of bearing wedges has been introduced as a complement to the manufacturer's pulley gear, flywheels and bearing pullers.

They are designed to overcome the problem of removing bearings, sprockets, and gears, which are flush against a surface and where there is insufficient space for the insertion of standard puller arms. The wedges are constructed from steel drop forgings, and are available in three sizes the capacities of which range from 0 to 5¾ in.

The back of the bearing wedge is flat whilst the inside is concave and has a finely tapered edge. This enables the halves of the bearing wedge to be inserted between the back plate or other surface and the object to be removed. The puller is then attached so that the arms grip the bearing wedge firmly.

Tightening the wedge bolts forces the halves closer together until full contact is obtained against the item being removed. During this process pressure on the puller should be maintained. Given this evenly distributed support the item being removed can be extracted without damaging the equipment or the backplate.

The smallest of the wedges, Model 526, has a capacity of 0-2¼ in. The Model 1028 separating tool has a capacity of ½-4¼ in., and the third, Model 20212, has a capacity of from 1-5¾ in.

Further details of this range of wedges may be obtained from the manufacturer, Martindale Electric Co. Ltd., Westmorland Road, London, N.W.9.

Radio-Active Type Lamps

A LAMP, which is claimed to operate for up to 10 years without attention has been developed in the U.S.A., with the trade name Isolite. It is suitable for a number of applications, including lanterns in railway service.

These lamps can be made in several sizes. One is considered useful for railway purposes, as, for example, in the revolving point lanterns widely used on American railways.

The source of light is phosphor crystals rendered luminescent by being sealed

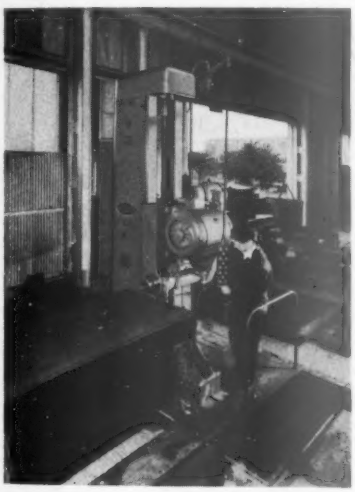
hermetically in a capsule of a radioactive gas known as Krypton 85. The railway lamp has a lens of ordinary type and is stated to give a light visible from 1,500 to 2,000 ft. depending on the angle of vision.

It is 6 in. long, weighs 10 lb., and can be ordered to emit a green, yellow or orange light. It is not clear from information so far available whether it would be possible to produce a lamp able to give a white light of sufficient value to be used, say, behind the spectacles of semaphore signals.

The manufacturer is the United States Radium Corporation, Morristown, New Jersey, U.S.A., from which company further details may be obtained.

Girder End Milling Machine

A MILLING machine for facing girder ends has been introduced recently. It has been designed specifically for structural engineering work with adequate power for milling, with carbide cutters, the ends of girders which often involve interrupted cutting and include welds and welding scale. The robust proportions of



the machine can be seen in the accompanying illustration which shows the operator's platform and pendant controls.

The spindle slide is of substantial section and the milling spindle is carried in a barrel and is mounted on precision bearings. A drawbolt is used for locking the cutter in the spindle. The barrel is adjusted endwise for depth of cut and a micrometer dial is arranged on the handwheel shaft which effects this adjustment so that depth of cut can be measured.

The spindle is driven by steel-core vee-ropes from a 20-h.p. motor mounted on the slide. Screw adjustment to the motor is provided to enable the vee-ropes to be tensioned and this facilitates alteration of spindle speed by changing pulleys.

Vertical traverse of 6 ft. is arranged. The substantial box section column is ribbed internally and the slide-ways are of liberal dimensions. Pulleys mounted in a bracket at the top of the column support a chain which is connected to the slide and to a weight hanging inside the column to balance the slide.

The long column base ensures accuracy and it is arranged on the ways of the traverse bed by means of taper and keep strips and scraper wipers are provided.

Horizontal feed is obtained by means of a two-speed motor mounted at the rear of the column. Horizontal traverse is 10 ft. on a traverse bed of robust proportions and the slide-ways of the bed are wide for ease of movement together with a narrow guiding portion which ensures accuracy.

A small self-contained motorised oiling unit is fitted to give automatic lubrication to the column traverse base, each feed from this unit being adjustable to prevent oil wastage. Telescopic metal covers are provided over the traverse bed ways to keep swarf clear of the ways and the horizontal feed screw. All control buttons are arranged in a pendant control box which can be swung round to the front of the machine. The overall height of the machine is 13 ft. 9 in.; overall floor space is 20 ft. 6 in. × 5 ft., and net weight 9¼ tons. approx.

Further details may be obtained from the manufacturer, William Asquith Limited, Halifax.

Electrodes for Mild Steel

ELECTRODES, developed for fast and economic welding of mild steel, are now being manufactured with the trade name Mirrospeed. They are stated to be easy to use and a "touch" technique is preferred so that even a moderately skilled welder can achieve sound results. They are suitable for production work where high output and good weld profile are of major importance because their characteristics include smooth running, quiet arc and fluid yet easily-controlled slag.

The electrodes are suitable for welding in all positions and are particularly useful for flat and horizontal-vertical fillet welding and flat butt welding. In fillet welding the electrode can be "drawn out" to give very long run lengths. In addition, it is usual to use one size larger gauge than normal, so that even longer runs can be made at high speeds, and less time is lost in changing electrodes.

The electrodes are manufactured in sizes ranging from 12-4 s.w.g. inclusive. They are fully extruded and coded under B.S. 1719 : 1951 classification as E.217, corresponding to the AWS/ASTM classification E.6012. They can be used on a.c. or d.c. supplies. In the case of d.c. the electrode can be connected to either pole. The electrodes conform to B.S. 639 : 1952, and are approved by Lloyd's Register of Shipping and the Ministry of Transport and Civil Aviation for welding mild steel in all positions.

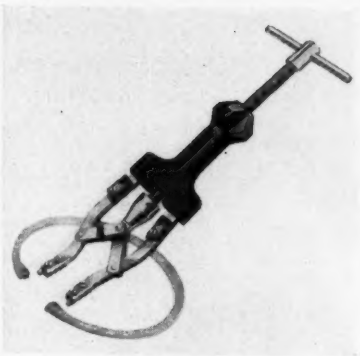
Mirrospeed electrodes are manufactured by Quasi-Arc Limited, Bilston, Staffs, from which further details may be obtained.

Circlip Tool

A TOOL which has been developed for internal and external circlips with a size range of 1¼-7 in. has been developed. Design features include controlled movement in either direction, detachable location pegs, and the method of operation allowing maximum accessibility.

The tool, No. 283, is primarily designed for removal or installation of internal and external circlips from confined places in vehicle hubs, housings on various types of heavy duty machinery, and so on. The method of expansion and contraction enables the user to have good control and clear vision during the operation, lessening the risk of personal injury.

Each tool is supplied with three pairs of location pegs to cover the range of



circlips sizes. One pair is assembled, the other two pairs being attached to tool body for use when required.

Further details may be obtained from the manufacturer, J. W. Pickavant & Co. Ltd., Apkoway Works, Birmingham, 1.

Warerite in Additional Colours

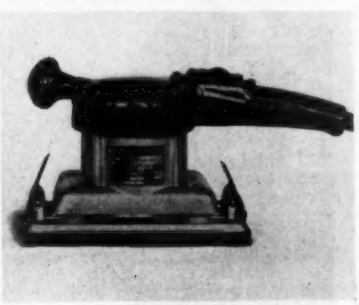
WARERITE laminated plastic veneers are now available in this country in plain colours, with both gloss and matt finishes. The manufacturer, Bakelite Limited, 12, Grosvenor Gardens, London, S.W.1, announces that a range of plain colours which has already been selling on the export market, is to be added to the standard range marketed in this country.

Heavy-Duty Sander

THE Festo RTH straight line action sander is a heavy duty industrial machine. It is the first completely straight-line-action sander not using sanding belts it is claimed and sands along the grain of the wood thus preventing circular scratches and giving a smooth finish suitable for french polishing or similar treatment. The sanding pad is driven by a direct positive drive for which provisional patent has been obtained. High cutting power is achieved by combining a long working stroke with a large sanding pad.

This machine is also stated to possess other advantages such as eliminating the expense of belts, the ability for the operator to reach right into internal corners, and the heavy-duty squirrel-cage type motor which has no brushes or commutator. As the pad does not move constantly in one direction there is no strenuous pull on the operator's arm. The upper portion is insulated against 2,000 V.

The RTH sander is available for delivery from stock. Further particulars may be obtained from the distributors in this country, Guilliet Sons & Co. Ltd., 28-30, Rivington Street, London, E.C.2.



Ministry of Transport Accident Report

St. Johns, Lewisham, December 4, 1957; British Railways, Southern Region

The late Lt.-Colonel G. R. S. Wilson, then Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation, opened, and his successor, Brigadier C. A. Langley, completed, the inquiry into the serious accident which occurred in dense fog at about 6.20 p.m. on December 4, 1957, at St. Johns, Lewisham, when the 4.56 p.m. steam express to Ramsgate, which had left Cannon Street 72 min. late, consisting of 11 bogie coaches, carrying about 700 passengers, drawn by "Battle of Britain" class locomotive No. 34066, failed to observe the colour-light signals applying to the down through line, overran the inner home signal at red and collided, 138 yd. farther on, at about 30 m.p.h. with the 5.18 p.m. 10-coach electric train, Charing Cross to Hayes, carrying about 1,500 passengers, standing with brakes fully applied, on account of the rising gradient, at the next signal in advance.

This was at danger because the 5.25 p.m. diesel-electric train, Charing Cross to Hastings, had been stopped by the signalman at Parks Bridge Junction under a misapprehension regarding the describer messages and who believed it to be the Hayes train, which he could not allow to pass to the mid-Kent line because of conflicting movements. The shock of the collision was necessarily severe and the body of the ninth coach of the Hayes train was forced through the eighth and much other damage done. Unfortunately the engine tender and front of the leading coach in the colliding train were crushed together and thrown to the left, destroying a stanchion of the heavy skew girder bridge carrying the Nunhead-Lewisham line over the main lines with the result that two girders collapsed, completed the destruction of the leading coach and crushed the second and half of the third. The 5.22 p.m. electric train, Holborn Viaduct to Dartford, was stopped short by the alertness of the motorman who, moving slowly towards the structure and a signal at red, observed the girders to be at an angle.

Casualties were very heavy; 88 passengers and a guard were killed and one passenger fatally injured. Large numbers had to be taken to hospital, where 109 were detained, many with serious injuries, including the fireman of the steam train and two drivers travelling in it on duty. Its driver was not physically injured but sustained severe shock. Neither he nor the fireman could be interviewed by Colonel Wilson until January 10 and the driver was still suffering from shock when seen by Brigadier Langley on May 21.

Fog made rescue work extremely difficult but considerable official sources of help were speedily drawn upon and, much assisted by voluntary organizations and lineside residents, dealt with great expedition with the heavy task; the last injured passenger was conveyed to hospital by 10.30. All lines were blocked and great dislocation of both passenger and freight services resulted. (Fortunately the connection to the North Kent line could be reopened the next morning.) As soon as possible work began, and went continuously forward, on removing the damaged vehicles and bridge and the main lines were reopened early on December 12, with the Nunhead-Lewisham line on a temporary bridge on January 13. (The report contains complete details of all these matters, with an artist's view of the bridge as it was, a photograph of the collapsed girders, drawings of the layout, locomotive, destroyed stanchion, signalling, etc., etc.).

The accompanying diagram shows the lines, signals, etc., essential to an understanding of the case.

Signalling

The lines are completely track circuited and equipped with four-aspect colour-light signals located on the average 490 yd. apart, reckoning from Cannon Street, installed in 1929. With nearly 1,000 trains daily passing St. Johns, at peak hours at the rate of about one every three-quarters of a minute, no mishap has occurred since then involving a passenger fatality until the accident under notice. The signalboxes immediately concerned, St. Johns and Parks Bridge Junction, have ordinary type lever frames, with electric lever locks, operating "controlled" signals, and Walker's type step-by-step train describers, working in pairs, one indicating the route to be taken by an approaching train, the other its class. Until this accident there was no special indication that a train was diesel-electric and not electric. At every signal not close to a box there is a driver's telephone; the circuits are of the omnibus type. Two men were on duty at St. Johns, working down and up traffic respectively, each with his own booking lad; there were also two at Parks Bridge Junction but no booking lad, owing to staff shortages. No fogman was stationed at any signal involved. Signals A.42—which is purely automatic—and L.16, 17, 18 (see plan) are immediately to the right of the down through line, owing to local conditions of clearance. Immediately after the accident the signal inspector and a linesman checked the condition of the apparatus and signals L.16, 17, 18, were found to be at red. (It is to be noted that when the St. Johns signalman reversed levers 16 and 17, intending to bring the express up to signal 18 at danger, he observed the repeater indicators to be correctly showing double yellow and yellow respectively.) Exhaustive tests made the next morning under the direction of the Assistant Signal Engineer showed the entire equipment to be in proper working order, with satisfactory circuit insulation and no possibility whatever of a false indication having been produced by electrical leakage.

Brake-Equipment

The most careful examination was made also of the brake equipment of the colliding engine and train, and several practical tests made which showed that the driver had made a full brake application before the collision and that the whole of the apparatus was in good order with no obstruction in any part of the piping or other defect which could have diminished its efficiency. It was shown too that the brakes had been working correctly on the stock during its journey from shed to starting station.

View of Signals and Visibility

At the time the signals were installed most of the engines running in the area had right-hand drive—the practice followed on the former S.E.C.R.—and fairly elaborate cantilever gantries would be needed to bring them to the left of the line. Colonel Wilson made trips on a "Battle of Britain" class engine in daylight and darkness but in clear weather, to see how the boiler, or other circumstance, affected the driver's view; these tests were followed by others during which careful measurements were taken. These showed that with visibility below 80 yd. a driver would not see signal A.42, or signals L.16, 17, 18, as the boiler would obscure even their glow.

Brigadier Langley also observed the signals from an engine of this class and one of the "Schools" class from which the range of view is better, although it is doubtful whether, in the very dense fog prevailing at the time, signals L.16, 17, 18 would have been visible from the driver's seat, even on these engines. The fireman ordinarily gets a longer view of signal A.42 than the driver but not of the other signals, although once in his view they remain so until passed. Engine No. 34066 was one of the original 70 built with cabs 8 ft. 6in. wide to enable them to work between Tonbridge and Hastings. (Forty more were given 9 ft. cabs.) The forward outlook from the rather narrow spectacle glass is not of the best and a signal on the right can become obscured sooner than it would with conventional designs of engine and cab. There is a side window but, for gauge reasons, the usual vertical glass wind shield is narrow and triangular and gives less protection than the larger rectangular one, so effective elsewhere.

Visibility had been bad in the London area that afternoon, varying from time to time and place to place, but the evening peak was being operated to normal timetable; no special "fog service" had been introduced. Brigadier Langley had to consider a great deal of evidence on this subject, the results of which are tabulated in the report. A member of the public, driving a car through the area, sent a clear and concise letter to the Ministry, which provided valuable information. It was made evident that visibility was not particularly bad as far as New Cross but was worse in the cutting below that station, with variations from time to time. It was so dense directly after the accident that the first people to begin rescue work at the point of impact did not realise the bridge had collapsed. Police walking from the station, estimated visibility as 10 yd.; on the other hand, the signal inspector, summoned about 10 min. later, found signal L.18 visible up to about 60 yd., at about 7 p.m.

Course of Events

A steam train, Cannon Street to Hastings, passed St. Johns on the through line at 6 p.m., followed by an ordinary electric train to Orpington; at 6.8 the Hastings diesel train passed. The signalman at St. Johns was confident he had sent correct descriptions for all three and the train register apparently confirmed that. His colleague at Parks Bridge Junction, however, became convinced that the diesel train was the train for Hayes, which was, in fact, behind it, and had certainly been described to him. As he could not allow the supposed required movement he stopped the train at signal M.10/12; its motorman said he telephoned from there, giving an exact description of his train and received the reply "all right." The signalman said that a diesel train driver did telephone to

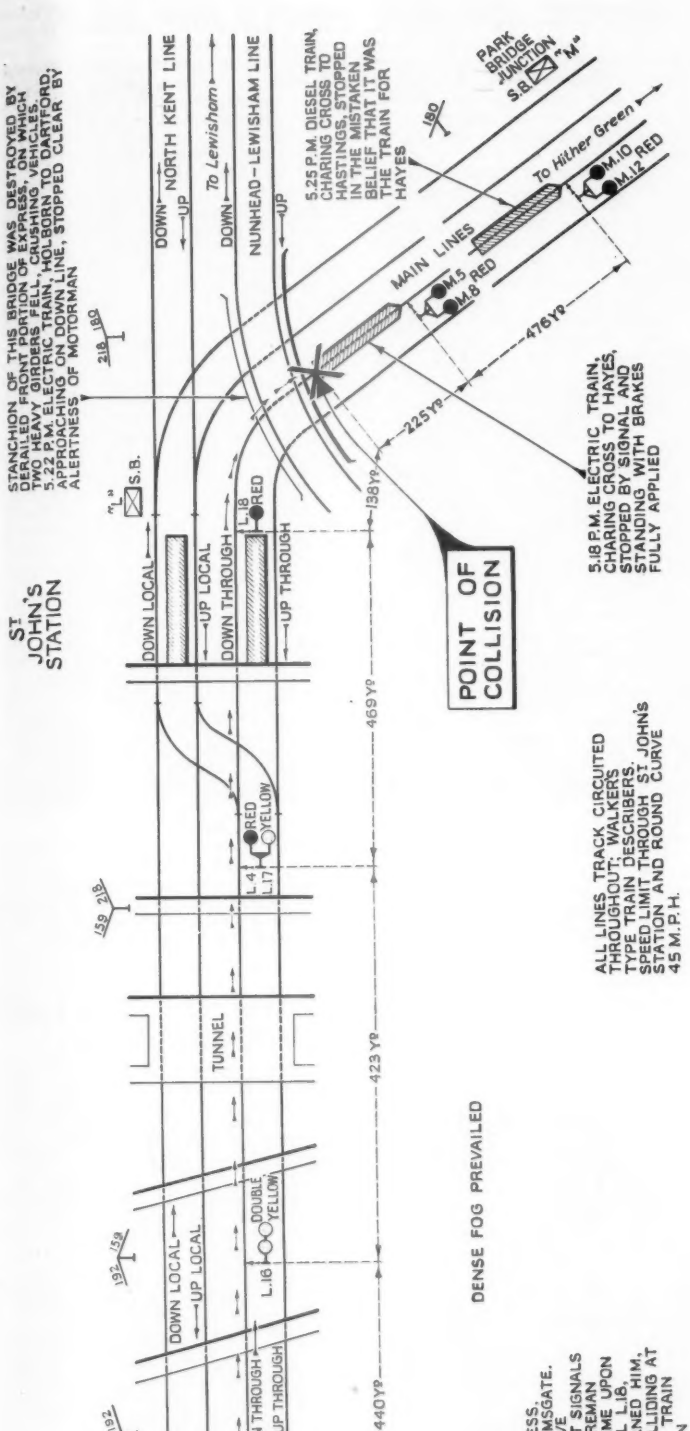


Diagram showing circumstances of accident at St. Johns, Lewisham, British Railways, Southern Region, December 4, 1957

him—he could hear its engines in the receiver; the noise almost drowned the driver's voice—but thought it must be at signal M.5/8. (The apparatus did not permit the signalman to tell directly from which signal a message came: he had to learn that from the speaker himself.) He imagined this train to have arrived undescribed, as occasionally descriptions were given late. The next he remembered was the "obstruction danger" signal. He could not remember a call from the driver of the Hayes train but was not prepared to say he did not receive one; that driver, however, said he did telephone clearly to the box, receiving the reply, "All right, when you get the aspect." This signalman continued under his wrong impression after the accident and remarked to the other man in the box that the express had "run into the back of a diesel."

The motorman of the Hayes train said he kept his brakes on after stopping at signal M.5/8, owing to the gradient, spoke to the box, as stated, and a few minutes later felt the jolt of the collision. It was the stopping of his train which correctly held signal L.18 at danger against the express.

There was no doubt whatever that that signal was over-run and, as it was proved that signals L.16, 17 must have been exhibiting the correct approach warnings, it became a matter of ascertaining how that had occurred from the evidence of the driver and fireman.

The driver was aged 62, with 45 years' service, 18 driving, and well spoken of by his superiors. He made statements to the District Motive Power Superintendent and his foreman and then was interviewed by Colonel Wilson. After giving details of the delayed start, etc., he said he had seen and acted on the warning aspects of signals L.16, 17. He contradicted himself about seeing the lights of St. Johns station but admitted he had never been stopped there before. He had stated before the coroner that he had seen and acted on these signals, but at his trial for manslaughter, which opened on April 21, 1958, denied seeing them. (The jury disagreed and a new trial took place on May 8: at this no evidence was offered and the driver was acquitted.)

With these various contradictions before him Brigadier Langley held it essential to hear more evidence and a verbatim extract, covering 36 questions and answers, appears in the report. At its conclusion the driver admitted that "the real answer" was he was not expecting to find signal L.18 at red. It was obvious that he had not seen its approach warnings.

The fireman, who had worked well with this driver for two years, said he was not asked by him to look for any signals until approaching St. Johns, nor did the driver cross the footplate to see any. He began firing after New Cross where he had seen signal A.42 at green. The driver did ask him to look for L.18, which in fact he usually did; when he saw it at red he called out and the driver at once braked. The regulator was, he thought, already closed. He thought he had fulfilled his duty by seeing signal A.42 and was justified in attending to the fire, as it was a good preparation for the long climb to Knockholt, until looking for L.18. He too said he had never been stopped at St. Johns. He thought they had gone through New Cross at 30 to 40 m.p.h., perhaps somewhat faster but at less than the usual speed there. To Brigadier Langley he explained that he did not lock for signals L.16, 17;

they were normally easily seen by the driver, but he did not realise the fog was so thick there. Had A.42 been at caution or he had known about the fog he would have looked out to help his driver.

The guard felt no brake application before the collision, which he thought took place at about 30 m.p.h., neither did two drivers and a clerk travelling in the train. Two ordinary passengers also felt none.

Conclusions

With the confirmation of the describer working given by the St. Johns train record it seems most probable that the signalman at Parks Bridge Junction missed the description for the diesel train, which he admitted was possible, and, having no record himself, supposed the Hayes train to be ahead of it, in its correct order. This led to both trains being stopped where they were; nevertheless this signalman was in no way responsible for the collision. The Hayes train was fully protected by signals.

The effect of the evidence and statements of the express driver has been given above; the question of visibility has to be considered. Brigadier Langley concludes it was down to between 10 and 30 yd. after New Cross, so that signals L.16, 17, 18 would have been obscured by the boiler before the driver could have seen their glow. The driver of the steam train to Hastings could not see them, although on a "Schools" class engine; he relied on his fireman.

Taking every factor into consideration, Brigadier Langley considers speed on collision must have been 30 m.p.h. or a little higher and although the express guard and others said that they felt no brake application accepts the fireman's evidence that the driver made one. There can be no question of any brake failure and no doubt the driver was taken by surprise when his fireman called out that the signal was red. Not a type to re-act rapidly it is probable he did not brake till after passing the signal. It would take less than 10 sec. from there to the obstruction.

It is difficult to understand a man with his experience and knowledge of the route making no attempt to observe signals L.16, 17 himself or ask the fireman to do so. In the prevailing conditions he should have crossed the cab or told the fireman to look out. It can only be concluded that he did not appreciate how severely visibility was reduced. Brigadier Langley has little doubt that having seen signal A.42 at green he assumed he would not be stopped at L.18, where he had never been stopped before, and consequently did not reduce speed on missing L.16 and 17. He is held solely responsible for the accident and nothing can be found to account for his lamentable failure except his unwarranted assumption about the signals.

Brigadier Langley does not criticise the fireman and is satisfied that he was, as customary, helping by looking for the signals seen normally first from his side. He saw A.42 at green and unaware that the fog thereafter was so dense took the opportunity to make up the fire. His statement that had he been aware of it he would have looked out is accepted.

Remarks and Recommendations

Warning automatic train control would have sounded a siren on the approach to signals L.16, 17 and 18. The driver would not have ignored such warnings while on a diesel or electric train he could scarcely have failed to see the signals. The British Transport Commission is doing all in its power to accelerate the programme for fitting such equipment which, on the Southern Region, will be done first between Waterloo, Exeter and Bournemouth; large quantities of apparatus are on order. This will not relieve drivers of their fundamental duty but will help them in poor visibility. Colour-light signals also are of great value and being increasingly installed. The results achieved in the area in which this accident took place have been referred to already. As on other occasions steam locomotive drivers have failed to respond to such signals it was decided to extend warning control to them, but with priority for lines mainly equipped with semaphores.

Suggestions have been made for applying an irrevocable train stop action at a signal at danger, used on London Transport lines where, however, conditions are exceptional, with overlaps sufficiently long for a train to be stopped within them, but relatively short. On main lines, with adequate distant signal warning, the overlap allows for misjudgment in stopping but not for absolute failure to apply the brakes. Train stops would increase the length of overlaps and reduce capacity unacceptably, be extremely costly and necessitate complete resignalling. In the 46 years, 1912 to 1957, warning control might have prevented 31 per cent of the fatalities in train accidents; with both forms of control this figure would have risen to only 38 per cent. The cost of installing the two would in no way be commensurate with the advantages obtained. Brigadier Langley considers therefore that for main lines in this country warning control is at present the best practicable aid to drivers.

Position of Signals

It is doubtful whether much improvement would result from moving the signals to the left between New Cross and St. Johns; short range view would be improved but the long range might be reduced. The problem will not long persist because modernisation provides for the replacement of all steam trains on this section. Signals have to be closely spaced there, with minimum overlaps, but a double yellow aspect, even without sighting distance, allows ample space for a diesel-electric or electric train to be stopped at the red one ahead. There is no need therefore to alter these signals or the priority of the A.T.C. programme. As the "Battle of Britain" engines will be running on the West of England lines, although no longer to Hastings, for many years it is recommended to fit them with wider windscreens until they are rebuilt with wider cabs. Replacement of the Walker's type describer with modern magazine equipment and selective ringing signal post telephones enabling a signalman to know from which signal a speaker is telephoning, is being reviewed under the modernisation programme.

Powerful tail lights also have been suggested but would not have been effective in this case; they could in some cases have prevented accidents and experiments to improve the present lights are being carried out. Radar cannot yet be considered as a substitute for, or an addition to, signalling and radio, also suggested by many, has not been found suitable in its present state of development, for controlling train movements in large numbers where many signalboxes are involved although in successful use in marshalling and shunting yards where misunderstanding will not endanger public safety. Investigations into the possibilities offered by electronics are proceeding. It is a great misfortune that the accident took place under the bridge, the design of which was adequate for normal loads. Brigadier Langley knows of no other case in which a bridge has collapsed in this way, but the problem will be considered in future design and, where practicable, safeguards included against risk of collapse should supports be struck accidentally.

Prompt Action

The commendably prompt action of the motorman in stopping the train in time on the line crossing the bridge saved the leading, and possibly the next, coach from toppling on to the wreckage below.

The alarm produced by the accident led to complaints that no "fog service" had been introduced. Such a service is put in force to reduce pressure on track capacity; it is not a safety precaution and has nothing to do with "fog signalling." Fog interferes less with railways than with other forms of transport but special precautions are necessary and covered by comprehensive rules, with stationing of fog signalmen and, where necessary, double block working. Only in exceptional circumstances are fogmen employed with colour-light signals. The extent to which movement continues on the railway compared with other forms of transport is striking evidence of the skill and endurance of the staff and efficiency of the system.

To ease the situation fog services are introduced where possible and fewer trains worked, but experience on the Eastern Section of the Southern Region, with peak hour trains normally over-crowded, shows any material reduction of business services to be undesirable, because of the resultant serious congestion of passengers at the London termini. Delay and overcrowding are inevitable at peak hours and in this section last winter conditions were aggravated by having only a temporary signalbox at Cannon Street.

The report pays a tribute to the skilful summary of the evidence and masterly presentation of facts prepared by the late Colonel Wilson, on which it is largely based, and expresses appreciation of the help received from Regional officers.

Brush Type "2" Diesel Trials in Scottish Region

One of the Brush Type "2" 1,250-h.p. main-line diesel-electric locomotives built for the Eastern Region of British Railways has recently undergone tests in the Scottish Region. These have been undertaken to determine what range of duties, passenger and freight, lies within the capacity of this locomotive. When a final assessment has been made of the results of its performance with class "A" and "B" passenger trains, class "C" fitted trains, and freight and mineral traffic, the capabilities of this locomotive type for service in the Scottish Region can be assessed.

It was accompanied by technical staff who collected the necessary data. Consideration will be given to the features of this diesel, compared with the ideas in mind for the Scottish Region for future forms of traction to improve various services throughout Scotland.

The locomotive was used on passenger duties between Glasgow and Mallaig; on the Highland line from Inverness to Wick; between Inverness, Perth, Glasgow; in the Fife area, where freight duties were performed, and between Edinburgh, Glasgow and Aberdeen. The 106-ton A1A-A1A locomotive was fully described in our issue of November 1, 1957.

Steam and Diesel Working on the East Coast Main Line

Up "Heart of Midlothian" near Offord & Buckden, handled by English Electric Type "4" diesel-electric locomotive

Down "Flying Scotsman" near the same spot as above, handled by Gresley "A4" Pacific, "Silver Fox"

Britain's Railway Queen

Management and Union join in goodwill enterprise

On September 13, at Belle Vue Stadium, Manchester, 15-year-old Miss Gloria Cripps of Derby was crowned Britain's 28th Railway Queen. The ceremony was performed under the joint presidency of Mr. H. C. Johnson, O.B.E., General Manager, Eastern Region, British Railways, and of Mr. S. F. Greene, J.P., General Secretary, National Union of Railwaymen.

Traditional Ceremony

The ceremony, which strictly follows traditional lines, began with a fanfare and band parade. Carrying in a casket the first Silver Link which began the Railway Queen's Chain of Office, the Clerk of Ceremonies in legal robes then approached the enthronement area in the centre of the Stadium. He was followed by Miss Teresa Boyden of Peterborough, the retiring Queen. The Queen Elect then made her appearance and was crowned while the British flag was hoisted and a peal of bells rang out.

After divesting the retiring Queen of her regalia and robes, the Clerk of Ceremonies placed an everyday coat over her long white dress and handed her the traditional symbolic suitcase. Miss Boyden then began her solitary walk to the stadium exit, a distance of some two hundred yards.

This part of the ceremony is designed to stress the importance of the office of Railway Queen as against that of the individual. It is intended to erase any illusion of self-importance which may have been generated by a year of limelight. When the Retiring Queen walks back to her daily life, theoretically she walks alone and disregarded by all. Nevertheless, Miss Boyden received repeated public applause during her retreat and, in a final moment of triumph, when she was driven in an open car round the Stadium to make her farewells to the assembled audience.

Award of Railway Queen's Trophy

The first act of Miss Gloria Cripps, the new Railway Queen, was to award the Railway Queen's Trophy to the winner of the Midget Car Race. This event, with other competitions and entertainments, had taken place in the Stadium during the course of the crowning ceremony.

At a pre-Crowning luncheon given by the Railway Queen's Council at the Bavaria Restaurant, Belle Vue, the principal guests were Mr. H. C. Johnson and Mr. S. F. Greene. Mr. J. E. Lawton, Chairman of the Railway Queen's Council, welcomed the guests.

Mr. Johnson said that Miss Boyden had worked hard during her reign. He stressed the particular value of her services in the present rather difficult times in fostering goodwill among railwaymen and women of all grades. He pointed out that, as long as this spirit existed, railwaymen would continue to confound their critics and would go ahead to an even better future. Like Mr. Greene, who spoke next, Mr. Johnson expressed his satisfaction that the presidency of the Railway Employees' Carnival was shared by both management and men.

Status of Office

Mr. Greene referred to the sequence of Railway Queens and to the probability that the office was the most constant of its kind in industry today. Miss Teresa Boyden then spoke briefly of her year of duty and of the friendship she had everywhere encountered.

A detailed description of the aims, manner of foundation, and function of the office of Britain's Railway Queen was given in an editorial in our February 21 issue, which also contained illustrations of the regalia of, and leading personalities in, the movement for the year 1957-58.

Mr. H. C. Johnson, General Manager, British Railways, Eastern Region (left) and Mr. S. F. Greene, General Secretary of the National Union of Railwaymen, crowning Miss Gloria Cripps as Britain's Railway Queen on September 13 at Manchester

New British Waterways Shops at Wigan

British Waterways has completed new engineering workshops at Wigan, on the Leeds & Liverpool Canal, for all major engineering work in the northern district of British Waterways North Western Division.

Site of Shops

The new shops are built on a two-acre site, with an existing dry dock, alongside the canal; they will now become the principal centre for craft repairs and for all types of waterways plant over some 270 miles of waterways lying north of the River Mersey. Boat repairs, and the construction and repair of lock gates, bridges, and so on have previously been carried out at a number of small establishments throughout the district. Considerable economic and traffic operating advantages are expected from this concentration of resources.

Layout Planned for Direct Labour

The layout allows all major engineering work for the district to be undertaken almost entirely by direct labour. The workshops include two slipways, fitting shop, blacksmiths' shop, lock gate shop, carpenters' shop and saw mill. Amongst the equipment are overhead cranes, varying in capacity from 2 to 6 tons, in the saw mill, lock gate shop, blacksmiths' shop and fitting shop, also gas ovens, pneumatic hearths, chain testing machine, drilling machine, and lathes. The slipways can accommodate four 60-ton barges; the hauling equipment consists of electric motor winches.

Construction of Building

The building, which measures approximately 320 ft. × 90 ft. × 20 ft. high, is of reinforced concrete columns, with prestressed concrete beams and side rails. The cladding is of asbestos cement, with glass roof lights and Perspex side lights. An open space to the east is to be developed as a fitting-out basin and storage area for timber and steel piles.

The main contractor was R. M. Douglas Limited.

Inauguration of Hollerith Electronic Computer, Western Region

First installation on British Railways

Mr. K. W. C. Grand and Colonel J. A. Davies watching Driver H. E. Jermey start the first Hollerith electronic computer at Paddington

The first Hollerith electronic computer on British Railways was officially inaugurated at Paddington, Western Region, on September 11, by ex-Engine Driver H. E. Jermey, who was introduced by Mr. K. W. C. Grand, General Manager, Western Region, in the presence of a number of Regional Officers and invited guests. Driver Jermey was the man selected to take the part of " Dai Powellson," a mythical railwayman whose payslip is the feature around which a brochure has been written designed to explain to members of the staff how the computer deals with the process of paybill preparation.

The installation represents the work of some three years of planning and organisation in new fields of office procedure. The net savings are anticipated to amount to over £4,000.

The Electronic Computer, which is housed in the Regional Accountant's London Centralised Paybill Office at Paddington and has been operating successfully for several months, is known as Hollerith type " 1201 " and is used for making up paybills for the London District of the Western Region. It can calculate and produce 750 payslips an hr. and takes less than 15 hr. computing time to prepare payslips and paybills for 11,000 employees.

Every Monday morning time sheets start to arrive at the Paybill Office from 116 separate sources, which may be stations, goods yards, engine sheds, and so on. From Old Oak Common Motive Power Depot alone come time sheets representing over 1,200 employees.

In the course of a single year, the London Centralised Paybill Office is responsible for the calculation of over 500,000 pay packets, involving a distribution of some £5,500,000 in cash. The departments concerned include Running & Maintenance, Operating, Civil Engineerig, Commercial, Mechanical & Electrical Engineering and the Accountant's.

From the Timekeeper's record of starting and finishing times, miles run and bonus, the computer calculates gross pay which, in addition to ordinary time, may include pay at enhanced rates for night duty, overtime or Sunday duty. The machine then assesses the income tax, deducts amounts due for such items as national insurance, life assurance, pension fund, savings, hostel fees, and so on, and arrives at the net amount for pyament. All this information is simultaneously printed on to a paybill and payslip. The computer works at electronic speeds, its overall computing speed being about 500 times faster than that of any conventional accounting machine. In processing each individual's payslip, the computer may have to perform 502 different programme steps in something under five sec., which is the time taken to carry out, for each employee, all the operations necessary to produce the final figure and the printing of the payslip for placing in the pay packet.

The Regional Officers accompanying Mr. Grand at the inaugural ceremony included Messrs. H. G. Bowles, Assistant General Manager (Administration); A. C. B. Pickford, Assistant General Manager (Traffic); and J. W. J. Webb, Regional Accountant. The British Tabulating Machine Company was represented by Colonel J. A. Davies, Managing Director (Engineering).

Reconstruction of Roofs at York Motive Power Depot

The construction of nearly 3¼ acres of new roof over York Motive Power Depot, North Eastern Region, is nearing completion. The movement of locomotives using the depot has continued unhindered throughout the operation.

The Chief Civil Engineer's Department and the Motive Power Department of the North Eastern Region have arranged, wherever possible, for railway facilities to be put at the disposal of the contractors, F. Shepherd & Son Ltd., York. Cranes, wagons and locomotives, and locomotive turntables have been used for manoeuvring beams and girders. The work includes new roofs over a repair shop and two locomotive roundhouses.

Equipment Used

A total of 1,286 units, ranging in weight from 3 cwt. to 14½ tons, and 7,423 cu. ft. of timber need to be raised to roof level. The equipment includes two railway breakdown cranes, diesel road cranes and derricks which at various times have been powered by hand, by electric winch and by a diesel locomotive.

As the site is bounded by road, railway and built-up areas and is thus already fully occupied there are problems of access and storage. The first difficulty is being overcome by using a temporary entrance, and to save storage space, the delivery of materials is phased to meet constructional requirements.

Staff and Labour Matters

Railway Wage Talks Continue

Railway union leaders and the British Transport Commission again failed to agree on September 16 on the terms of reference of the body which is to conduct the railway wage review. Their meeting was adjourned until September 18.

Busmen's Wages

The dispute over the pay of employees of private bus companies and in undertakings controlled by the British Transport Commission has been referred by the Minister of Labour to the Industrial Disputes Tribunal.

At a meeting of the National Council for the Omnibus Industry held on August 8, the employers made an offer of an increase of 5s. a week on basic rates of pay and improvements in certain working conditions. This offer was not acceptable to the unions. In the circumstances the employers suggested that the claims should be submitted to the Industrial Court but the unions rejected this and intimated that they would refer them to the Ministry of Labour for arbitration by the Industrial Disputes Tribunal.

The offer of 5s. which was rejected was in line with the increase given to country bus crews employed by London Transport.

Shipbuilding Workers Pay Claim

At a meeting on September 9 between the Shipbuilding Employers Federation and leaders of the Confederation of Shipbuilding & Engineering Unions, the union representatives rejected as totally inadequate the wage increases offered by the Employers Federation in response to their claim for a substantial increase. These were 5s. 6d. a week for skilled workers, 5s. for semi-skilled workers, and 4s. 6d. for unskilled workers. The position now will be considered by the unions affiliated to the Confederation to decide the next step.

The Employers Federation declined the claim of the Confederation for the introduction of a 40-hour week by stages.

At a meeting on September 11, the C.S.E.U. decided to go back to the Employers Federation and press for greater concessions on pay and hours of duty.

Contracts and Tenders

British Railways contracts for miscellaneous works and equipment

British Railways, Scottish Region, has placed the following contracts :—

Paterson Hughes Engineering Co. Ltd., Glasgow : 25-ton electric travelling goliath crane, Bridgeton Goods Station, Glasgow

John Boyd & Co. (Engrs.) Ltd., Annan : two 7-ton fixed jib manual yard cranes, Lockerbie and Newton Stewart

P. Cameron (Builders) Limited, Aberdeen : erection of store, Waterloo Goods Station, Aberdeen

Whittaker Hall & Co. (1929) Ltd., Manchester : rotary air compressor, St. Rollox Works, Glasgow

The Consolidated Pneumatic Tool Co. Ltd., London : Hi-cycle tools and frequency changers, St. Rollox Works, Glasgow

Alex Findlay & Co. Ltd., Motherwell: steelwork in crane gantry, portal frames and tup tester, Motherwell permanent way depot

Murdoch Mackenzie Ltd., Motherwell : sub-structure of new underbridge, Thornton

The Brightside Heating & Engineering Co. Ltd., Edinburgh : heating installation, Townhill Junction new wagon repair depot, Dunfermline

P. & W. MacLellan Limited, Glasgow : supply and erection of footbridges, Partick Hill, Anniesland, Westerton, Drumchapel, Drumry, Singer, Dalmuir Park, Bearsden and Hillfoot

Holland & Hannen and Cubitts (Scotland) Limited, Edinburgh : superstructure of new power-operated signalbox, Glasgow Central

James Laidlaw & Sons Ltd., Rutherglen : new station buildings, Newton.

British Railways, North Eastern Region, has placed the following contracts :—

F. H. Wheeler & Co. Ltd., Newcastle : electrical installation, South Gosforth Car Sheds

Concrete (Scotland) Limited, Falkirk: concrete girders for bridges Nos. 28 and 66, Alne-Pilmoor Widening

Holmpress Piles Limited, Hull : piling to columns, Dringhouses, York, bridge 44

Kitchen & Wade Limited, Halifax : radial drilling machine, Darlington Faverdale Works

J. Parkinson & Son (Shipley) Ltd., Shipley : universal miller, Darlington Faverdale Works

Brighouse Estate Co. (Builders) Ltd., Bradford : inspection pit, foundations, and pump house, Leeds Neville Hill Motive Power Depot

J. T. Hymas, Harrogate : sinking of boreholes, Shafton Tunnel, Dearne Valley Branch

Cawood Wharton & Co. Ltd., Harrogate : extensions to boiler house and locker room, and erection of new toilet accommodation and general building work, Leeds Neville Hill Motive Power Depot.

British Railways, Eastern Region, has placed the following contracts:

Wm. Wright & Son (Lincoln) Ltd., Lincoln: construction of carriage washing plant, carriage cleaning platforms, cleaners' store, pavings at Lincoln Diesel Maintenance Depot

Metropolitan Vickers GRS Limited, London, W.C.2: supply and installation of telecommunications cables between Greenwood and Potters Bar

Steels Engineering Products Limited, London, S.W.1: supply and delivery of one "Coles" model S.410 full circle slewing diesel-electric mobile crane and one "Coles" model S.410 full circle slewing diesel-electric mobile crane complete with electro magnet and ancillary equipment for Chesterton Junction Central Permanent Way Depot.

All the cutlery and flatware for British Railways, Eastern Region, diesel-hauled Pullman express, the "Master Cutler," has been supplied by Gladwin Limited, Sheffield.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From South Africa

660 superheater flue tubes, 22 ft. 10½ in. by 5½ in. by $\frac{3}{16}$ in.

33 superheater flue tubes, 18 ft. 11 in. by 5¼ in. by $\frac{3}{16}$ in.

40 solid drawn steel tubes, 15 ft. by 4½ in. dia. by ¼ in. thick

1,000 solid drawn steel tubes, 12 ft. by 4¾ in. dia. by $\frac{3}{16}$ in. thick

12 solid drawn steel tubes 16 ft. by 5½ in. dia. by ¼ in. thick

12 solid drawn steel tubes 12 ft. by 6¼ in. by ¼ in. thick

12 solid drawn steel tubes 15 ft. by 6¾ in. dia. by ¼ in. thick

2 solid drawn steel tubes 20 ft. by 3½ in. dia. by $\frac{5}{32}$ in. thick

103 superheater elements.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. H. 7478: Superheater Flue, Solid Drawn Steel Tubes, and Superheater Elements" should be addressed to:—The Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is October 3, 1958. Local representation is essential. The Board of Trade reference is ESB/22132/58.

From Formosa

1 lot steel channel, carbon steel

1 lot steel angle, carbon steel

1 lot cu-bearing steel plate

1 lot steel plate, carbon steel

1 lot steel flat bar, carbon steel; spring steel wire; steel round bar, carbon steel; steel square bar, carbon steel; gas pipe; angle joints; T joints; unions, and elbows

1 lot automatic couplers, follower guides and plates, coupling release levers, hand brake shafts, hinge door shafts, hinge door arms, brake shaft brackets, chains, hinge door shaft brackets, lever and balance weights, connecting rods, hand brake shaft brackets, brake shaft and arms, bevel gears, worm and worm wheels, air hose dummy couplings with chains, triple valves, brake cylinders, cut-off cocks, dust collectors, air hoses and coupling, release valves, drain cocks, bogie trucks, hinges, spring brackets, wheel and axles, bearing springs, spring hanger links, spring seats, angle cocks, brake cylinders and auxiliary reservoirs, triple valves, exhaust chokes, brake beams, brake beam hangers, brake block hanger brackets, brake rods, side brake locking devices, rope brackets, and foot levers.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan (Formosa). The tender No. is 84-33-427-6-80253. This purchase will be financed by the International Co-operation Administration (I.C.A.), the agency through which the United States Government gives economic and technical assistance to other countries. The closing date is October 13, 1958. The Board of Trade reference is ESB/22306/58/I.C.A.

From Jordan

2,000 m. of rails 12·5 kg. per m.

Fish plates, bolts, and nuts for 2,000 m. of rails.

The issuing authority is the Jordan Phosphate Mines Company, P.O. Box 30, Amman, Jordan. The tender No. is 22. Tenderers should quote on the basis of c.i.f. Aqaba Port, Jordan, stating the date of delivery. The closing date is September 25, 1958. The Board of Trade reference is ESB/22221/58.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1.).

Approval has been given to construction of the east-west underground line of the Toronto Transit Commission, to which reference was made in our March 14 issue. The project is estimated to cost $200,000,000.

Notes and News

Easco Electrical (Holdings) Limited, Agency.—Easco Electrical (Holdings) Limited has appointed Bonham Sound Service Limited, Coventry, as exclusive agents for the installation, sale, and service of all Easco public address, amplifying, and loudspeaker intercommunication equipment for Coventry and district.

Improved Railbus Services in Bedford Area.—Faster and more frequent railbus services on the Bedford-Northampton and Bedford-Hitchin lines of the London Midland Region were introduced on Monday last with the introduction of the winter timetable. Between Bedford and Northampton eight new services will be introduced, bringing the daily total up to 18, nine in each direction. Also, improved timings will achieve savings of 2-9 min. in the overall journey times. On the Bedford-Hitchin branch there will be 14 services daily, seven in each direction, compared with four each way at present. Retimings on this branch will save 4-12 min. on the overall times. The railbuses were first placed into service in August; the vehicles, built by Park Royal Vehicles Limited, were described in our August 15 issue.

N.E. Region Export Express Service Extended.—British Railways, North Eastern Region, export express service for full wagonloads of export traffic for shipment through Liverpool and Manchester Docks, introduced on June 30 last, has been extended. This service, which gives an assured "next-day" arrival, is now

available on Mondays to Fridays from certain stations in the West Riding, including Bradford, Dewsbury, Halifax, Huddersfield, Leeds Wellington Street, Sowerby Bridge, and Wakefield. There are now 48 of the more important industrial centres in the Region from which this service to Liverpool and Manchester Docks is available.

Credits for Brazilian Manufacturers.—In our issue of June 27, 1958, on page 737, we made reference to two Brazilian companies, Cia. Brasileira de Material Ferroviario (Cobrasma) and Cobrasma-Rockwell Eixos, having obtained credits of U.S. $1,600,000 and U.S. $5,300,000 respectively to import equipment for the production of axles and other railway material. We are now informed that the equipment is for the production of complete axles for motor lorries.

Investigation into 3-hr. Delay in the Southern Region.—After the incident at Mitcham Common Southern Region, British Railways, on September 2, when a Bognor Regis train was delayed for 3 hr., as reported in our issue of September 5, the management of the Southern Region immediately called for an exhaustive report. This is now being studied. The general system for dealing with emergencies of this kind is stated to be sound; there were, however, serious weaknesses in its application in this case. Steps are being taken to see that as far as possible delays are minimised and to ensure that the fullest available information is given to passengers likely to be affected.

Culworth Station to be Closed.—The London Midland Region has announced that Culworth Station, between Woodford Halse and Aylesbury Town, is to be closed on and from Monday, September 29, 1958. Passengers should book to Banbury or Northampton and travel thence by the buses of K.W. Services Limited. Parcels and passenger train merchandise will be dealt with at Brackley. Small consignments of traffic by freight train will still be dealt with at Brackley Central. Only full loads of freight train traffic, merchandise, minerals and coal and so on, will continue to be dealt with at Culworth. Livestock by freight train will be handled at Woodford Halse or Helmdon according to the requirements of the traders.

More Cars for Export by Special Rail Wagons.—Since the end of June this year, when the traffic started, over 1,300 motorcars, mainly for export, have been despatched by rail from Coventry to various parts of the country. An advantage of the use of rail transport for cars is that they arrive at their destinations having travelled only a few miles. They are carried on specially equipped flat wagons and are loaded by being driven up a ramp and along the line of wagons from one end to the other. Over 300 wagons have been altered to suit the traffic. The vehicles despatched from Coventry are products of the Rootes Group, but similar use is made of the railway service by Vauxhall Motors of Luton.

Scottish Region Passenger Train Service Withdrawals.—British Railways, Scottish Region, has announced that with the approval of the Transport Users' Consultative Committee for Scotland, the passenger train services will be withdrawn from Wishaw South station (Lanarkshire) and from Falkland Road, Bogside and East Grange stations (Fife) from September 15. Alternative rail and/or bus facilities are available in the areas concerned.

B.R.S. Cadet Training Scheme.—British Road Services has selected 20 candidates to take part in its 1958 cadet training scheme; this provides for two years' special training to assist candidates to qualify for promotion to higher administrative, managerial and supervisory grades, and is open to members of B.R.S. staffs and university graduates. Cadets will receive individual training at various levels of the organisation and emphasis will be placed on practical work. The training programme will include experience in general haulage, parcels yards, loading banks, traffic operation, office routine, accountancy, repairs and maintenance. The first six months of training are probationary.

Opening of K & L Steel Castings Dressing Shop at Halstead, Essex.—The K & L Steelfounders & Engineers Limited steel castings dressing shop at Halstead, Essex, was officially opened by Mr. R. A. Butler, Lord Privy Seal, last Saturday. Ground works on the building was started last November, and completed this month. The total working area is about 25,000 sq. ft. and auxiliary buildings include an office block and a service maintenance section. Facilities for employees include showers, changing rooms and canteen. The total cost of the project is around £90,000. Work will commence at the factory later in the month. During the first year of operation it is estimated that a force of between 25 and 50 men will be built up. The factory is capable of a much greater output than can possibly be achieved in the first 12 months; and it is expected that some 100 employees will be required within two years of operation.

British Railways Goods Vehicle at Commercial Motor Show.—The stand of Scammell Lorries Limited, of Watford, at the Commercial Motor Show to be held at Earls Court, London, from September 26 to October 4, will include one of the company's 3-ton Scarab mechanical horses finished in British Railways livery. The motive unit will be shown coupled to a 15-ft. semi-trailer. The Scarab is the more recent version of the manufacturer's range of mechanical horses of which some 7,500 of all versions, with 30,000 semi-trailers, are in operation on British Railways.

Road Casualties in July.—Road casualty figures for July show that 508 people were killed, 6,505 seriously injured, and 22,355 slightly injured, making a total for all casualties of 29,368. Compared with July, 1957, there was a decrease of four in the killed and an increase of 1,267 in the total. Traffic on main roads was estimated to be 9 per cent heavier than in July, 1957.

Aire Junction to Bullcroft Goods Branch to be Closed.—Because of the operating loss, British Railways, North Eastern Region, is to withdraw freight train facilities and close the line from Aire Junction to Bullcroft on October 20. The stations to be closed are Pollington, Sykehouse, and Thorpe in Balne. The measure has the approval of the Transport Users' Consultative Committee for the Yorkshire Area and the Central Transport Consultative Committee. Snaith will be available as an alternative goods depot and the arrangements whereby small consignments are dealt with by British Railways road motor services operating from Goole and Doncaster will continue.

N.E. Region Railway Stations Gardens Competition.—The standard of floral display in railway station gardens in the North Eastern Region of British Railways was again very high and in this year's competition for the best-kept station gardens, six stations qualified for special class awards, the same number as last year. Beverley has gained its fourth successive special, whilst Middleton-in-Teesdale,

New Refreshment Terrace at Euston

The Continental style refreshment terrace opened last week at Euston, London Midland Region (see our September 12 issue)

Stocksfield and Wetherall have been awarded specials for three years running. First class awards were given to 23 stations, second class to 42, third class to 75, and certificates of commendation to 16 stations.

Cardiff-Maindy Passenger Service Withdrawn.—British Railways, Western Region, has withdrawn the passenger train service between Cardiff Bute Road and Maindy Halt. Woodville Road and Maindy Halts, which were served by trains on the branch, are closed. Road services are operated in the area by the Cardiff Corporation.

Engineering Design Conference at Birmingham.—The Council of Industrial Design, in collaboration with the Birmingham Exchange & Engineering Centre, is sponsoring a one-day conference, "Industrial Design and the Engineering Industries," at the Birmingham Exchange & Engineering Centre on November 12. The Chairman will be Mr. Whitney Straight, Vice-Chairman of Rolls Royce Limited, and the opening address will be by Lord Mills, Minister of Power.

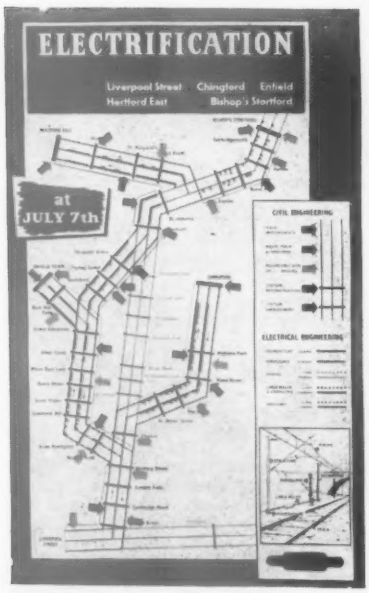
First Mobile Medical Colour Television Unit in Britain.—The first mobile medical colour television unit to be produced in this country illustrates one of the numerous applications of British Insulated Callender's Cables Limited polypole coupler systems. This unit was manufactured by Marconi's Wireless Telegraph Co. Ltd. to the order of Smith Kline & French Laboratories Limited, pharmaceutical manufacturers. The cameras are three-tube Marconi Image Orthicon type designed to function through an 88-way multicore television camera cable. Two 100-ft. lengths of this cable are permanently attached to the equipment and two additional 250-ft. lengths are available when the cameras are operating at a greater distance from the vehicle. The cable is a polythene insulated multi-core type made by B.I.C.C. and specially designed for use with colour television camera equipment. Other applications for which B.I.C.C. cable and coupler systems are suitable include, for example, supervisory remote control equipment, U.H.F. links, and coal mining gear and industrial television camera chains.

New B.I.C.C. Depot at Chessington.—British Insulated Callender's Cables Limited opened a new depot at Oakcroft Road, Chessington, Surrey, tel. Lower Hook 2323, on September 15. The stocks to be held will include a comprehensive range of rubber, thermoplastic and mineral insulated cables, and accessories.

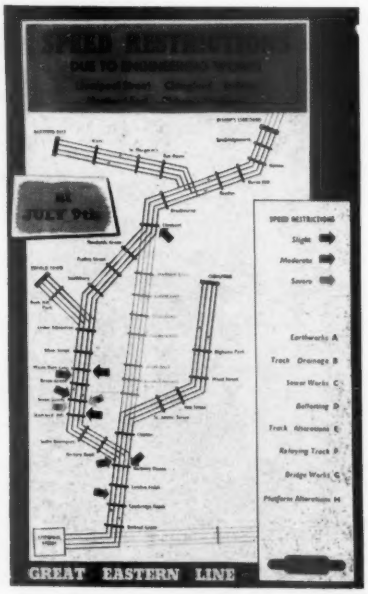
Broomwade Public Works Exhibits.—Broom & Wade products will be on show at the Public Works Exhibition which will be held at Olympia, London, from November 10-15. These will consist of portable rotary and stationary air compressor plants and pneumatic tools. The rotary plants will include examples of the recently-introduced stream-lined canopy. A coloured sound film will be shown entitled, "The story of the development, manufacture and performance of the Whirlwind Uniflo oil-flooded, rotary air compressor."

Diesel Locomotives at Devons Road Motive Power Depot.—In last week's Scrap Heap, reference was made to the illustration showing a steam tank locomotive passing two diesel locomotives on its last trip from Devons Road Motive Power Depot. One of the diesels, No. D8207, was inadvertently described as an English Electric 1,000-h.p. Type "1" mixed-traffic unit; this locomotive is, in fact, one of ten 800-h.p. Type "1" locomotives built by British Thomson-Houston Co. Ltd. for the London Midland Region, all of which are to be allocated to the depot. The B.T.H. locomotives are powered by Paxman 16-cylinder YHXL Vee-type diesel engines.

Modernisation Progress Shown in Posters



British Railways, Eastern Region, poster showing electrification progress in London suburban area



Speed restrictions in area, caused by engineering works; colours are used for keys in both posters

Automatic Station Announcing

The General Electric Co. Ltd. automatic announcer at Gatwick Airport Station, Southern Region, British Railways (see our August 29 issue)

Accident on German Mountain Railway.—Fourteen people are reported to have been killed and over 50 injured when a three-coach train was derailed earlier this week on the rack railway from Königswinter to the Drachenfels, near Bonn. All the vehicles overturned.

Diesel Railcar on Windsor Branch of Western Region.—The Western Region of British Railways has introduced a diesel railcar on the Slough-Windsor branch as from Monday last. The vehicle, built by Gloucester Railway Carriage & Wagon Co. Ltd., has seating accommodation for 65 second class passengers and will replace the existing A.E.C. railcars which were introduced by the former Great Western Railway.

Railway Students' Association.—The opening meeting of the Railway Students' Association will take place at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, on Wednesday, October 29, at 6.30 p.m., when Mr. A. B. B. Valentine, Member, British Transport Commission, will deliver his Presidential Address. The Chair will be taken on this occasion by Mr. A. H. Grainger, the retiring Chairman.

Accident on the Central Railroad of New Jersey, United States.—A passenger train, travelling between Bayonne and Elizabeth in New Jersey on the Central Railroad of New Jersey, U.S.A., plunged 50 ft. from an open bridge into Newark Bay on September 15. Two locomotives in tandem and the two leading coaches were completely submerged in 35 ft. of water; a third coach, suspended from the bridge,

fell later and two more remained on the track. Passengers from the third coach were helped to safety before it fell, but at least 40 people from the leading two coaches were killed. The bridge had been opened to let an oil tanker through but according to railway officials the train should have been halted by an automatic device though the distant signal was apparently open.

Brazilian Orders for Rails.—The Brazilian Development Bank has been authorised to import 27,000 tons of rails from Czechoslovakia and 24,000 tons from Japan. Minimum credits of three years are being allowed by the manufacturers, Mitsubishi of Tokyo, and official credit organisations in Prague.

Railway Benevolent Institution.—At a meeting on September 15 the board of the Railway Benevolent Institution granted annuities to seven widows and five members involving an additional liability of £274 10s. per annum; 168 gratuities were also granted amounting to £1,663 to meet cases of immediate necessity. Grants made from the Casualty Fund during the months of July and August amounted to £2,177.

Modernisation of Dentonholme Goods Depot, L.M. Region.—Dentonholme Goods depot, Carlisle, British Railways, London Midland Region, is to be modernised to speed up wagon turn-round and effect a general improved efficiency. The work, which started on September 8, will follow the alteration and improvement scheme now in progress at the Crown Street goods depot. The work involves the displacement of East side deck and renewal of West side shed deck, and improved lighting. An improved wagon feed will also be provided and eight fixed cranes at present in the sheds will be replaced by a one-ton battery electric mobile crane, and five Scott electric elevating trucks will be brought into use on the shed deck.

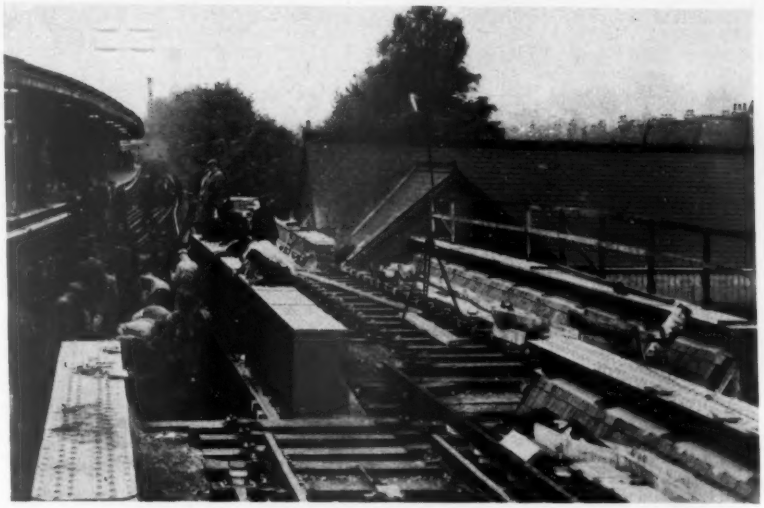
British Internal Combustion Engine Research Association Report.—In the report of Council of the British Internal Combustion Engine Research Association for the year ended March 31, the accounts show a slight increase in the grant-earning income of £34,531, compared with £33,800 for last year. But as new terms of grants come into operation the amount of Government grant was reduced by £1,300. Informal talks as to the possible amalgamation of the Association with the Motor Industry Research Association were discontinued. An alternative possibility is, however, now being examined.

Signal-Catenary Gantry at Valence.—In connection with the electrification of the Lyons-Valence line of the French National Railways, it was necessary to erect a new gantry to support both the signals and catenary south of Valence Station. Two metal supporting posts were erected in advance, one on each side of the track, after which the gantry girder, 98 ft. long and weighing 10 *tonnes*, was brought to the site on a special workshop wagon. A crane lifted the girder off the wagon and dropped it on to the top of the supports, this taking only ten min. without any serious effect on operations.

Railbuses on Steep Gradients.—Lightweight diesel railbuses of the standard German Federal Railway pattern have replaced the last steam passenger trains on the rack line from Obernzell to Wegscheid in Northern Bavaria. Although the rack section includes a section of 1 in 14, the buses can climb by adhesion. The steam rack locomotives remain in use for a daily goods train.

Roof Renewal at Manchester Exchange Station, L.M. Region.—Work is now in progress on the renewal of the roof on the west end of Manchester Exchange Station, London Midland Region, British Railways. The task involves 8¼ bays of roof with a length of some 720 ft. and should be completed by June next year. The roof over the other parts of the station, which was damaged by enemy action during the war, was completely replaced in 1946-7. The main contractors are Kyle Stewart Contractors Limited.

Kent Coast Electrification Work



A section of a new underline bridge being moved into position at Shortlands, Kent, Southern Region, British Railways, as part of the £45,000,000 *Kent Coast electrification scheme*

Inaugural Run of the "Master Cutler"

The up "Master Cutler" Pullman express from Sheffield Victoria to Kings Cross approaching Brookman's Park on its inaugural run on September 15; *the diesel locomotive is Type* "4" *No. D*207, *built by the English Electric Co. Ltd.* (*see editorial comment on page* 322)

Forthcoming Meetings

September 19 (*Fri.*).—Railway Correspondence & Travel Society, at the Railway Clearing House, Eversholt Street, N.W.1, at 7.15 p.m. Illustrated lecture on "The Talyllyn Railway," by the Earl of Northesk.

September 20 (*Sat.*).—Railway Correspondence & Travel Society, South of England Branch, at the C.B.B. Employees' Club, Palmerston Road, Boscombe, at 5.30 p.m., by Mr. E. A. Course.

September 20 (*Sat.*).—Permanent Way Institution, East Anglia Section. Visit to Potters Bar new tunnel.

September 20 (*Sat.*).—Permanent Way Institution, London Section. Visit to London Airport engineering base to

inspect hangars, workshops and aircraft under maintenance.

September 21 (*Sun.*).—South Yorkshire Rail Tour No. 4.

September 22 (*Mon.*).—Historical Model Railway Society, at the Railway Tavern, Liverpool Street, London, E.C.2, at 7 p.m. Paper on old Irish railways entitled "Locomotives and Leprechauns," by Mr. R. G. Dettmar.

September 23 (*Tues.*).—Railway Correspondence & Travel Society, West Midlands Branch, at 64, Holyhead Road, Coventry, at 7.30 p.m. Mr. A. F. Cook will discuss locomotive development on the former L.M.S.R.

September 24 (*Wed.*).—Permanent Way Institution, London Section, at the Headquarters of the British Transport Commission, 222, Marylebone Road, London, N.W.1, at 6.30 p.m. Paper on "Permanent way section manning and its relation to track standards," by Mr. W. A. Hissey.

September 24 (*Wed.*).—Railway Correspondence & Travel Society, West Riding branch, at the British Railways Social & Recreation Club, Aire Street, Leeds, 1, at 7.30 p.m. Paper by Mr. R. N. Hardy, on "Stewarts Lane 1952-1954," illustrated.

September 29 (*Mon.*).—Railway Correspondence & Travel Society, Northampton Branch, at the Liberal Club, Castilian Street, Northampton, at 7.30 p.m. Paper on "The Lynton and Barnstaple Railway," by Mr. R. E. Tustin.

September 30 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Paper on "The North Eastern Region of British Railways," by Mr. R. A. Savill.

October 3 (*Fri.*).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Members' meeting with paper by Mr. A. W. H. Pearsall: "The Furness Railway."

October 1 (*Wed.*).—British Railways (Southern Region) Lecture & Debating Society, at the Chapter House, St. Thomas' Street, S.E.1, at 6 p.m. Opening meeting.

October 4 (*Sat.*).—Railway Correspondence & Travel Society: "The Sapper" rail tour.

October 7 (*Tue.*).—Permanent Way Institution, Leeds & Bradford Section, at the British Railways Social & Recreation Club, Ellis Court, Leeds City Station, at 7 p.m. Paper on "The Industrial Injuries Act," by Dr. S. Hulme, Medical Officer of British Railways, Southern Region.

October 7 (*Tue.*).—South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, in the Angel Hotel, Westgate Street, Cardiff, at 6.30 p.m. "The history of the Cunard Line," by Mr. A. D. Lobley, Publicity Manager, Cunard Steamship Co. Ltd.

October 7 (*Tues.*).—Railway Correspondence & Travel Society, Sheffield Branch, at Livesey Clegg House, Union Street, Sheffield, at 7.30 p.m. Illustrated paper on "The Leak & Manifold Railway," by Dr. J. R. Hollick.

October 8 (*Wed.*).—Railway Correspondence & Travel Society, West Midlands Branch, at the Engineering Centre, Birmingham (outside New Street). Mr. R. Shenton will give an illustrated description of his railway travels in Finland.

October 16 (*Thu.*).—Diesel Engineers' & Users' Association, at The Memorial Hall, the Institute of Marine Engineers, 76, Mark Lane, London, E.C.3, at 2 p.m. Annual general meeting.

Railway Stock Market

Stock markets have continued to take their cue mainly from the strength of Wall Street and showed buoyancy again despite the uncertainty regarding international affairs. Expectations persist in the City that the bank rate is likely to go down to 4 per cent before long; and it is assumed that the Commonwealth Conference will result in proposals for expanding trade of the sterling area. It is because of these hopeful views that British Funds have again risen on balance, and why industrial shares are unaffected by company statements showing lower profits this year. The Prime Minister's statement that a general election is not planned for this year was also a helpful factor for markets.

Canadian Pacifics reflected the strength of Wall Street, and at $51¼ were slightly higher than a week ago; the preference stock eased from 54¼ to 54, but on the other hand, the 4 per cent debentures were 67, compared with 66¼ a week ago. White Pass shares were little changed at $13½.

Chilean Northern first debentures were 46, while Costa Rica ordinary stock changed hands at 16 and the first debentures were 75. Guayaquil & Quito bonds were quoted at 90 and Paraguay Central prior debentures were 10½.

International of Central America shares were again quoted at $19½ and the preferred stock at $115. Elsewhere, Mexican Central "A" bearer debentures gained a point at 71. San Paulo Railway 3s. units at 2s. were the same as a week ago, and Brazil Railway bonds remained at 5½. Buyers have been in evidence for Nyasaland Railways shares, which changed hands around 12s.; the 3½ per cent debentures were 68½. Midland Railway of Western Australia stock was quoted at 6½ and the 4½ per cent first debentures at 75½. Emu Bay 4½ per cent debentures were 37½ xd. In other directions, Barsi Light Railway stock was 24, West of India Portuguese capital stock 77½ and the 5 per cent debentures 67½.

Among shares of locomotive builders and engineers, G. D. Peters remained firmly held as usual, and were 23s. 9d. Gloucester Wagon 10s. shares at 15s. 7½d. eased 3d. and Wagon Repairs 5s. shares lost a similar amount at 10s. 6d. Westinghouse Brake kept firm at 39s., but Birmingham Wagon eased after their recent improvement, and were 18s. 9d. compared with 19s. 3d. North British Locomotive at 12s. 3d. were the same as a week ago, Beyer Peacock 5s. shares eased from 8s. 4½d. to 8s. 1½d., and Charles Roberts 5s. shares were 9s. 4½d. compared with 9s. 9d.

Associated Electrical at 53s. 3d. were well maintained, English Electric moved up from 56s. 10½d. to 57s. 3d. and General Electric were 36s. 6d., a gain of 3d. on balance. Davy & United Engineering have moved up to 71s. 6d.xd on the assumption that the dividend should be maintained on the larger capital arising from the rights issue. Elsewhere, a little profit-taking put T. W. Ward back to 78s. 3d. and Ruston & Hornsby were slightly lower on balance at 22s. 7½d., but British Timken have been good with a rise to 51s. 9d. Renold Chain were 36s. 6d. and Tube Investments became firmer at 60s., while Vickers have been steady at 33s. 9d. awaiting the interim dividend. In other directions, Crompton Parkinson 5s. shares held their recent rise to 11s. 7½d.

John Thompson 5s. shares have eased slightly to 24s. 6d. awaiting the outcome of the take-over offer made for Thompson Bros. (Bilston), whose 5s. shares were 11s. 6d.xd. F. Perkins 10s. shares were 8s. 10½d. and elsewhere, Dowty Group 10s. shares eased to 37s., but Pressed Steel 5s. shares rose further from 18s. 3d. to 18s. 9d., their highest this year. British Oxygen at 38s. 9d. have not held best prices, despite the belief that there are good prospects for expecting the dividend to be maintained. Vokes 4s. shares showed firmness at 18s. 7½d. and G. & J. Weir kept at 16s. 3d. Metal Industries were 36s. 1½d. and Birmid Industries 74s. 6d. There has been a firmer trend in George Cohen 5s. shares at 10s. 1½d.xd, while Coventry Gauge 10s. shares were steady at 16s. 1½d., but in a slightly easier machine tool section, Alfred Herbert receded a few pence to 36s. 3d. Crofts Engineers 5s. shares were 15s. 1½d. Glynwed Tubes 5s. shares have eased to 17s. 4½d. Babcock & Wilcox at 49s. 3d. regained an earlier small decline.

OFFICIAL NOTICES